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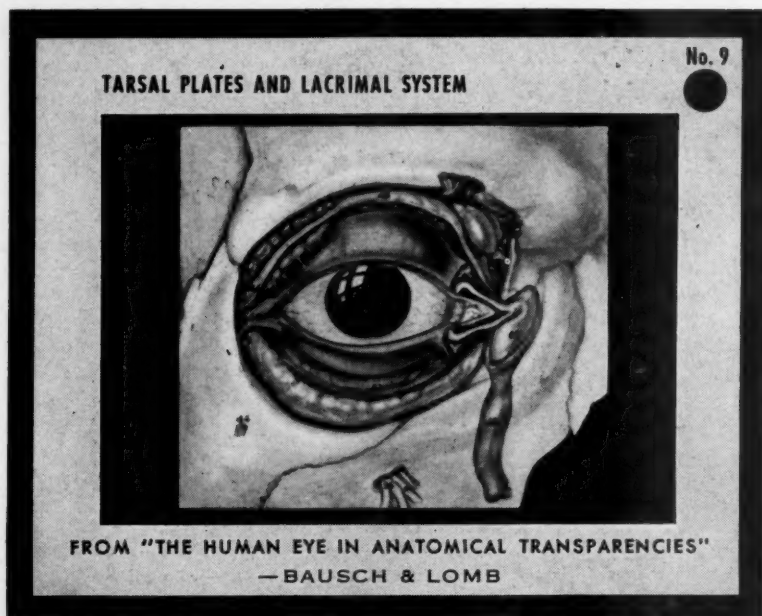
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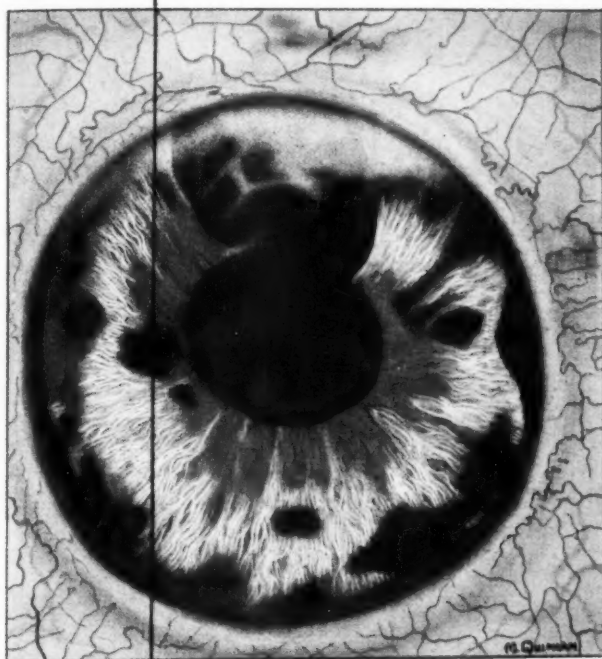


FIG. 6 a

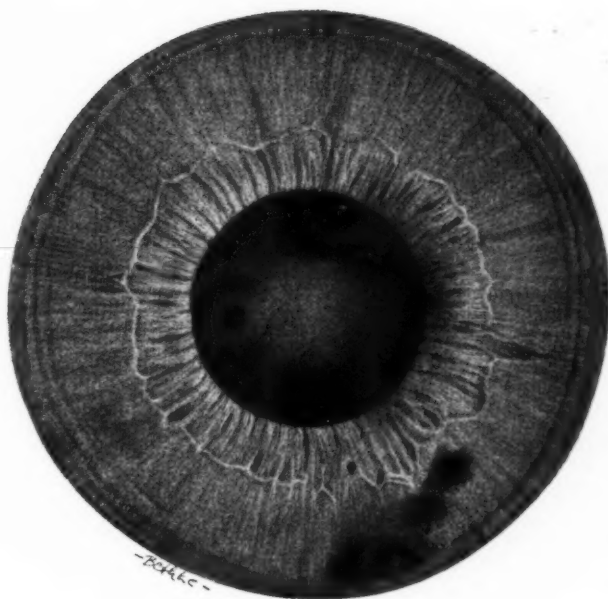


FIG. 4 a

FIG. 6 a (REESE). FLAT DIFFUSE RING TYPE OF MALIGNANT MELANOMA OF THE IRIS AND CILIARY BODY. OPERATIVE COLOBOMA ABOVE FOR SECONDARY GLAUCOMA. LINE INDICATES THE SITE OF SECTION IN FIGURE 6 b.

FIG. 4 a. FRECKLES ON THE IRIS OF AN EYE WITH A MALIGNANT MELANOMA OF THE CHOROID. THERE WERE NO FRECKLES ON THE IRIS OF THE FELLOW EYE.

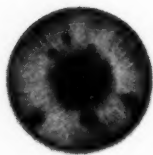


FIG. 3

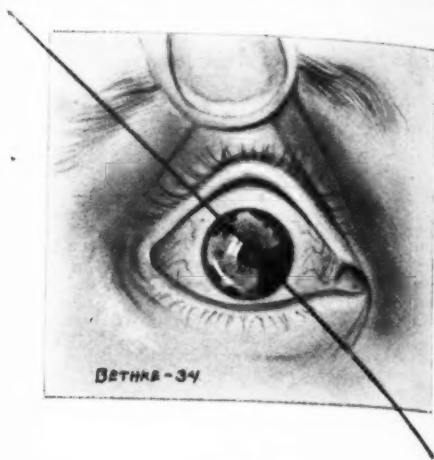


FIG. 9 a

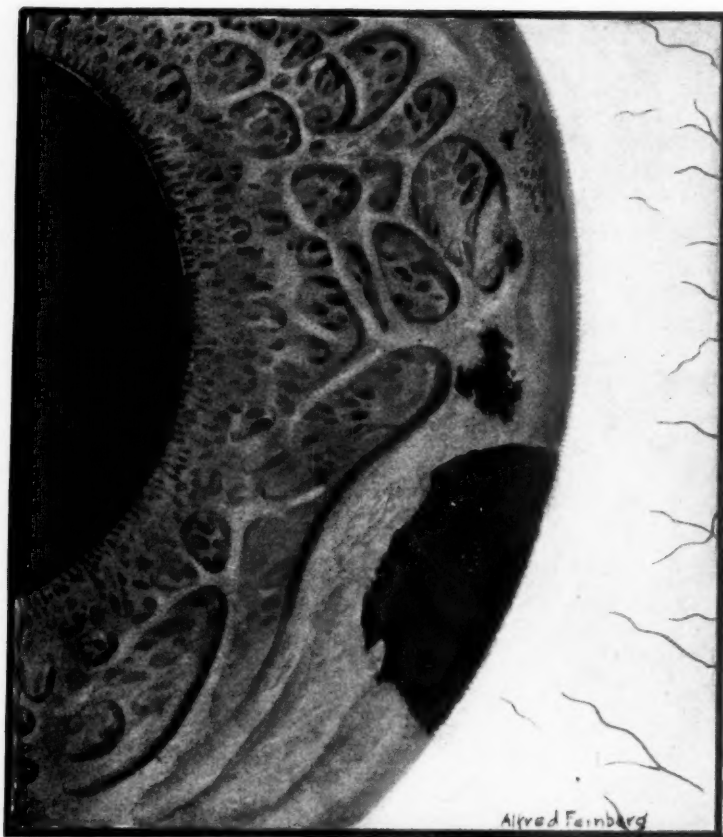


FIG. 7 a

FIG. 3 (REESE). FRECKLES ON THE IRIS OF AN EYE WITH A MALIGNANT MELANOMA OF THE CHOROID, THERE WERE NO FRECKLES ON THE IRIS OF THE FELLOW EYE.

FIG. 9 a. A DIFFUSE MALIGNANT MELANOMA OF THE IRIS. THERE WAS SECONDARY GLAUCOMA, LINE INDICATES THE SITE OF THE SECTION IN FIGURE 9 b.

FIG. 7 a. A MELANOMA OF THE IRIS OBSERVED FOR EIGHT YEARS BEFORE GROWTH WAS DETECTED COINCIDENT WITH THE APPEARANCE OF TWO IRIS FRECKLES ABOVE THE MAIN LESION. AFTER $2\frac{1}{2}$ MONTHS MORE A THIRD FRECKLE APPEARED ABOVE THE OTHER TWO.

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PIGMENT FRECKLES OF THE IRIS (BENIGN MELANOMAS): THEIR SIGNIFICANCE IN RELATION TO MALIGNANT MELANOMA OF THE UVEA*

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New York

The presence of freckles on the anterior surface of the iris is common. Out of 300 adult patients with supposedly normal eyes, they were noted on one or both irides in 145, or 48 percent. In 93, or 31 percent of these, the freckles were on both irides (about equal in 82, greater on one iris than on the other in 11) and unilateral in 52 or 17 percent. These statistics are based on adult eyes as these pigment freckles do not appear before the age of 6 to 8 years and rarely before 12 years. This is in keeping with the occurrence of pigmented nevi of the skin, which also appear at this age. Although the term "freckles" seems convenient to employ clinically, these iris lesions really represent multiple benign melanomas.

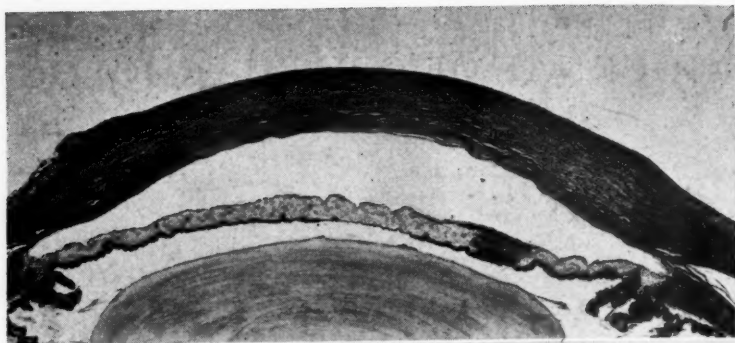
The author has noted the more frequent occurrence of benign melanomas of the iris in the microscopic sections of eyes harboring malignant melanomas of the uveal tract. These have been observed in 13 eyes in which the malignant melanoma was present in the choroid and in 6 eyes in which it was present in the iris or ciliary body.

The histologic difference between the melanomas of the iris seen in normal

eyes and those seen in eyes with malignant melanoma seems to be one of degree. In the case of the normal eye the lesion is a localized accumulation of densely pigmented melanoblasts only a few cells thick along the anterior surface of the iris. In fact, the lesion could be characterized as merely a localized thickening of the anterior limiting layer of the iris which, in some instances, has the appearance of being proliferated endothelium. Such a lesion may sometimes contain little or no pigment.

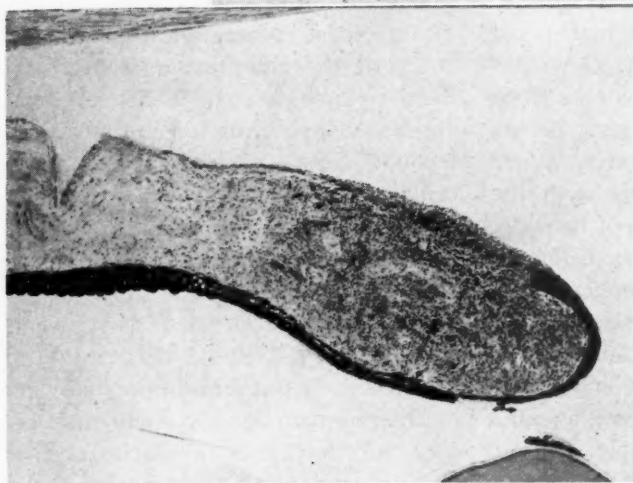
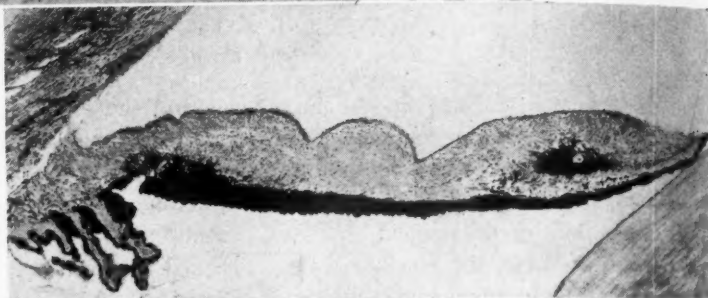
The melanomas of the iris in eyes with malignant melanoma are more extensive lesions (fig. 1 a, b, c, d). They tend to be slightly more elevated above the iris surface and to extend deeper into the iris stroma. Sometimes they actually arise in the stroma (fig. 1 b) and may even cause an increase in the thickness of the iris. In one instance an ectropion uvea was produced (fig. 1 c). The type cell is the melanoblast, varying in shape from plump polygonal to long, branching, pigmented cells. When the cells spread through the entire thickness of the iris, they seem to have a predilection to abut on the dilator-muscle layer in a manner that steel fragments display toward a magnet. The cells are more matured than those of the malignant melanoma but sometimes less matured than those comprising the physiologic melanomas of the

*From the Institute of Ophthalmology of the Presbyterian Hospital. Read at the seventy-ninth annual meeting of the American Ophthalmological Society, Hot Springs, Virginia, June 11, 1943.



1 a, A benign melanoma of the iris extending through the entire thickness of the stroma.

1 b, A benign melanoma of the iris arising in the iris stroma.



1 c, A benign melanoma of the iris occupying the entire pupillary area, increasing the thickness of the stroma and causing an ectropion of the uvea (from the collection of Dr. Georgiana Theobald).

1 d, A benign melanoma of the iris occupying the pupillary area. The cells composing this resemble more closely the cells of the malignant melanoma of the choroid than in cases "a," "b," and "c."

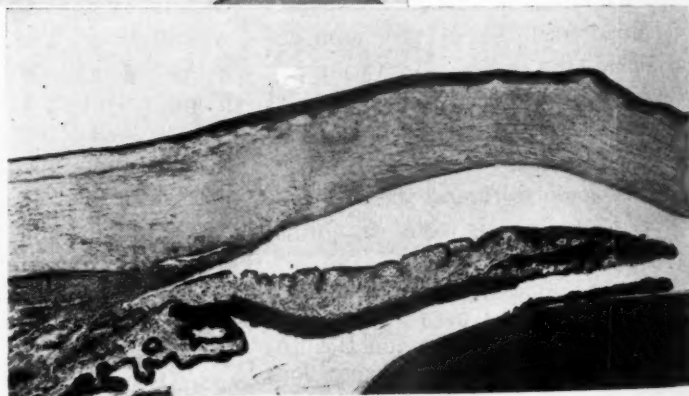


Fig. 1 (Reese). Four illustrations of benign melanoma of the iris in eyes with malignant melanoma of the choroid.

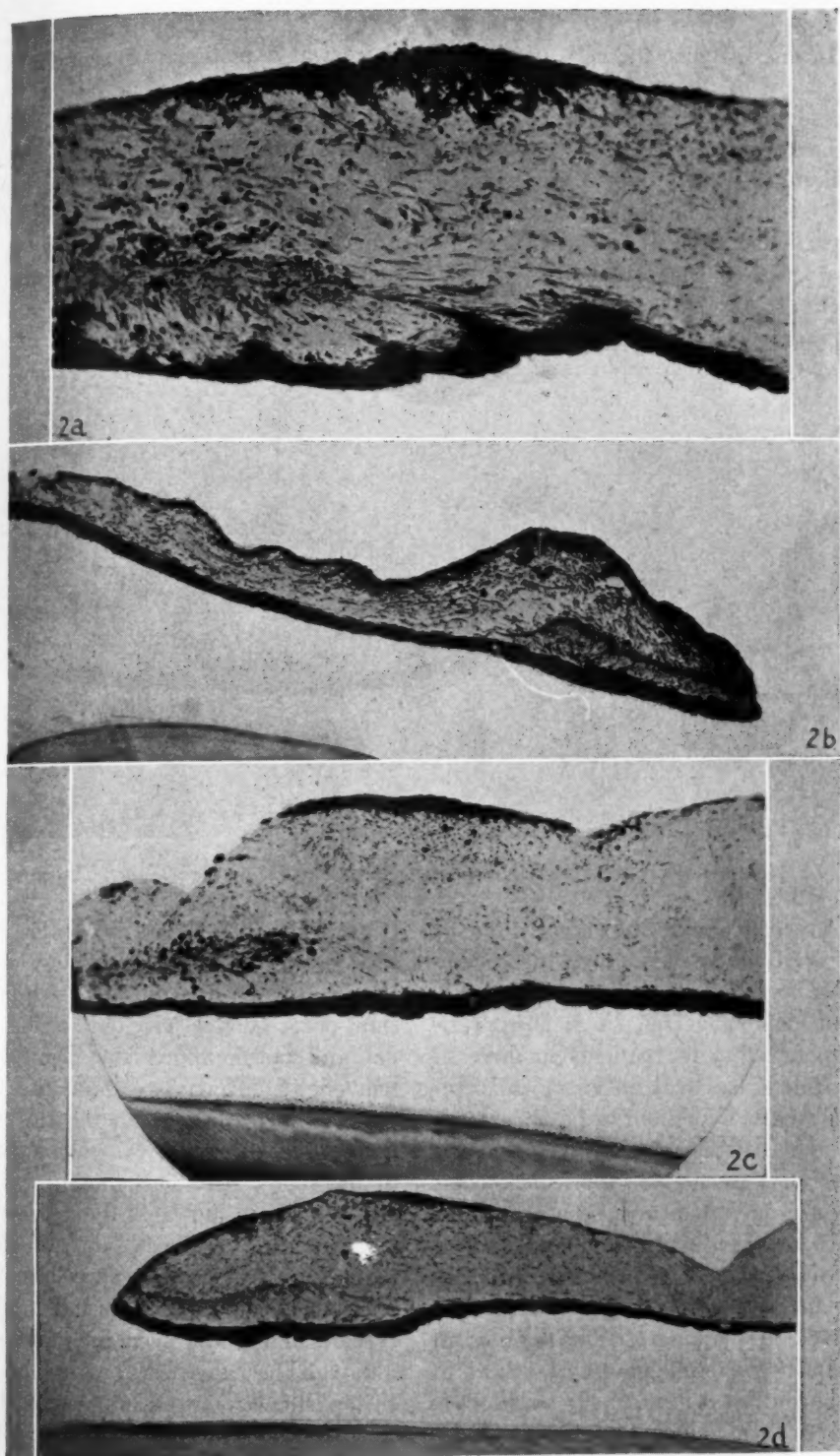


Fig. 2 (Reese). Four illustrations of benign melanomas of the iris in eyes with normal irides and not harboring a malignant melanoma of the choroid.

iris. In one instance the cells of the iris lesion were of about the same maturity as those of the malignant melanoma in the choroid (fig. 1 d). No endothelium has been identified over their surface. There seems to be no predilection for any particular area of the iris. There is no tendency to encapsulation.

Sections of 100 eyes not having a malignant melanoma and with normal irides were examined and iris melanomas

there was a malignant melanoma of the choroid and not present on the iris of the fellow eye. In the first case (fig. 3, plate 2), the choroidal tumor located in the macular region was flat and nonpigmented, and a differential diagnosis from other conditions was necessary. In the second case (seen through the courtesy of Dr. R. C. Castroviejo), there was a retinal detachment over the choroidal tumor and the diagnosis was not clear

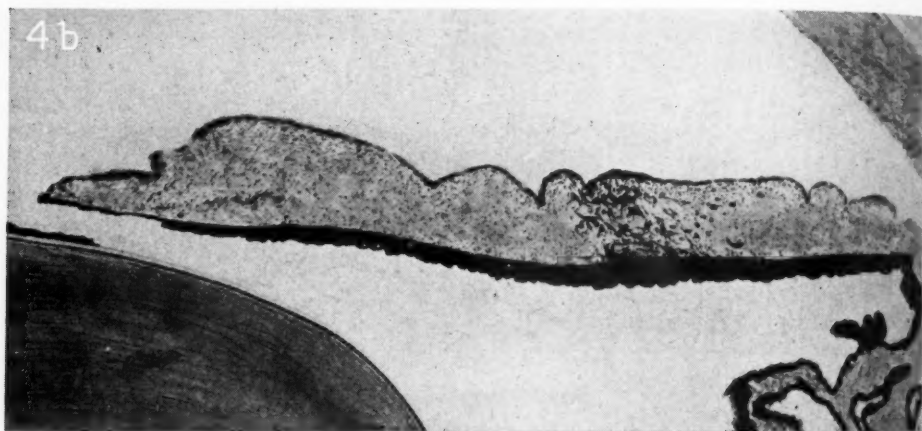


Fig. 4 b (Reese). Microscopic section through the large freckle on the iris shown in figure 4 a.

were noted in 26, or 26 percent. Four of these were extensive enough to be comparable to those seen in eyes with malignant melanoma (fig. 2). It is interesting to note that the patients in three of these four cases had an extraocular tumor but not a malignant melanoma; however, most of the normal eyes that the author has available for microscopic study are ones that have been enucleated because of a neoplasm of the adnexa.

Because of the frequency with which these melanomas of the iris have been observed in the microscopic sections of eyes harboring malignant melanomas of the choroid, the author made an effort to identify them clinically. In three instances pigment freckles have been noted as present on the iris of the eye in which

(figs. 4 a, plate 1, and 4 b). The third case (seen through the courtesy of Dr. W. A. Boyce) was one in which the lesion occupied the macular region, was flat, and had no appreciable pigment content (fig. 5). In each of these three cases freckles were present on the iris of the involved eye and not present on the iris of the fellow eye. This finding was considered significant and thought to lend substantiating evidence to the correct diagnosis. No difference was noted clinically between the appearance of these freckles and those seen in normal eyes, although the cases were not studied with this particular object in view. The fact that freckles were present on one iris and not present on the other was considered most significant. What their appearance

would have to be in order to be of significance in cases with bilateral physiologic freckles, or in cases with freckles normally more marked on one iris than on the other, is not known. From the microscopic picture there should be some clinical differences, if only for the reason that the one is more extensive than the other. A sufficient number of cases have not been seen clinically to allow any statement as to possible differences to be made. Even the most extensive ones seen microscopically were not noted clinically.

These melanomas of the iris are considered manifestations of multiple origin of the tumor. They are composed almost invariably of more matured tumor cells than is the main lesion, or of completely matured cells, and are therefore benign with little or no power of active growth. Similar instances of multiple origin of melanomas are seen elsewhere in the uveal tract. In the cases studied here the main lesion is in the choroid and the lesser lesion is in the iris, but it may be elsewhere in the choroid or in the ciliary body. The main lesion, moreover, may be in the ciliary body and the lesser one in the iris or choroid, or the main lesion may be in the iris and the lesser lesion also in the iris or in the choroid.

The question of whether or not these iris melanomas are implantation growths must be considered. Such manifestations of cancer are well known. In cases of retinoblastoma implantation growths are frequently seen, and the anterior surface of the iris is not an uncommon site. Such manifestations in cases of malignant melanoma of the uvea occur but are extremely rare. They are more frequently seen when the primary growth occurs in the ciliary body and iris. In such cases the disseminated tumor cells have easy access to the anterior chamber where they may implant themselves and grow along the iris and in the filtration angle. Such

implantation growths around the circumference of the angle and iris are responsible for the ring character of some malignant melanomas (fig. 6 a, plate 1, and fig. 6 b). The melanomas of the iris discussed in this paper do not seem to be implantation growths. The cells composing them are not comparable usually

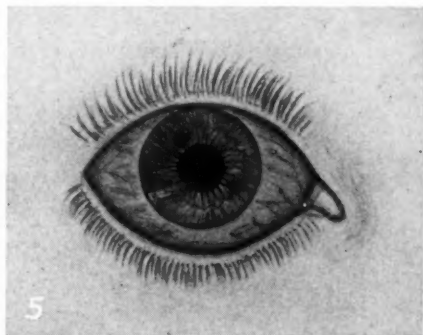


Fig. 5 (Reese). Freckles on the iris of an eye with a malignant melanoma of the choroid. There were no freckles on the iris of the fellow eye.

to the cells of the primary lesion. In only one instance were the cells of the iris lesion of about the same maturity as those of the choroidal lesion (fig. 1 d). Furthermore, the melanomas studied here tended to involve the entire iris, whereas implantation growths occur on the surface. The writer has never seen an implantation lesion of the iris from a malignant melanoma of the choroid.

In cases of malignant melanoma of the skin there may occur daughter areas or freckles around the primary focus, and these are generally said to be extensions along the lymphatics. The comparable iris lesions, however, do not seem to represent extension along the lymphatics from the primary focus but are usually multiple origins. They may very exceptionally represent implantation and, even more rarely, they may represent direct extensions by continuity along the iris surface from the primary lesion.

The question of whether the iris lesions are metastatic foci carried through the blood stream from the choroidal lesion hardly warrants consideration. The author has seen one instance of a metastasis by way of the blood stream from the primary site of the malignant melanoma in the uvea to a site elsewhere in the eye. In this case the primary lesion was

that malignant melanomas of the uvea are neurogenic in origin—it can be argued that the multiple origin of melanomas of the uvea all emanate from some common neurotrophic influence.

This is borne out in a case reported by Goldstein and Wexler.² Their patient had multiple neurofibromata of the skin, multiple pigment lesions of the skin, fi-

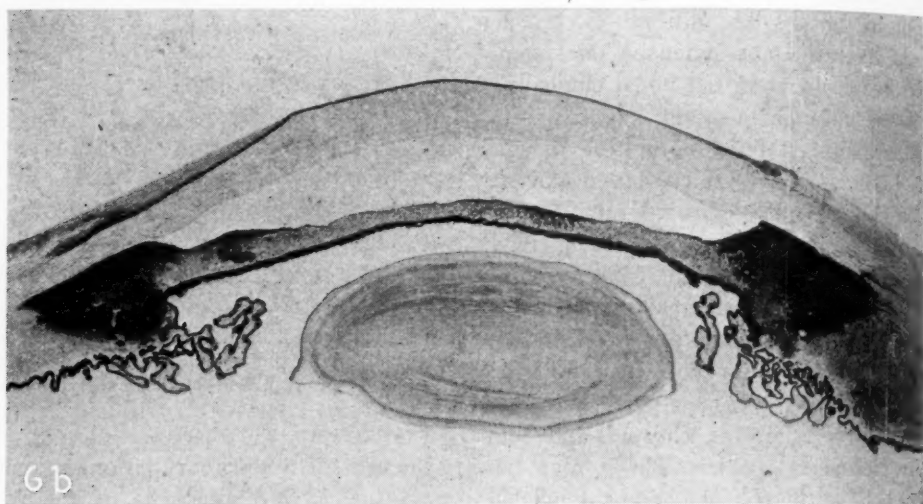


Fig. 6 b (Reese). Microscopic section of above case (line in figure 6 a indicates site of section) showing one iris growth from implantation and one from direct extension along the anterior surface of the iris from lesion in the ciliary body. Other sections showed iris lesions which were instances of multiple origin.

in the choroid and the small metastatic focus was in the vascular layer of the ciliary body on the opposite side.

The nature of these multiple origins. Benign pigment lesions in the form of melanosis (café-au-lait spots) and nevi occur in the skin and tissue adjacent and distal to such neurogenic tumors as neurofibromatosis. Also, the common skin nevus is thought to be neurogenic. Thus, there seems to be some relationship between pigment production and nerve-tissue function or aberration. Assuming therefore that Georgiana Dvorak-Theobald's¹ contention is correct—namely,

bro sarcoma of the back, and multiple melanomas of both irides. There were also stigmata of acromegaly and other features indicating tumor involvement of the central nervous system. This case illustrates the multiple origin of melanomas, associated with multiple neurogenic tumors, manifesting one malignant focus as well as innumerable benign foci all over the body, including the irides.

In cases of neurofibromatosis sometimes the multiple manifestations of the disease, including the pigment lesion, tend to follow the distribution of a nerve. In cases of malignant melanoma of the uvea the iris melanomas do not seem neces-

sarily to appear in the same quadrant or sector of the eye, indicating the same nerve distribution.

Another conception of the multiple manifestation of melanomas is that some cancerigenic agent acts on the whole uveal tract causing a malignant melanoma at one site and more or less benign melanomas at other sites. There are similar occurrences elsewhere in the body. Among these can be mentioned cancerous lesions that occur simultaneously throughout the gastro-intestinal tract (mouth, esophagus, stomach, and rectum). Also, there may be papillomatous lesions over a wide area of the gastro-intestinal tract; epitheliomatous lesions over the face with simultaneous and widespread multiple precancerous lesions, in which instance the cancerigenic agent is thought to be the actinic effect of the sun's rays; in the mouth there may occur multiple carcinomas and precancerous lesions that are thought by some to have a common cause in syphilis, in avitaminosis, or perhaps in the use of tobacco. Lymphosarcoma may manifest itself for a long time at one site as a localized tumor and later show multiple origins elsewhere. Both breasts and both ovaries may be simultaneously affected with cancer or precancerous lesions. The multiple origin of a retinoblastoma not only in the one eye but in both eyes is well known, and the primary site is malignant, whereas the secondary sites may be relatively benign. In all of these instances there seems to be some common agent or factor at work producing tumor changes of varying degrees over a wide area of a particular system. Verhoeff has suggested that some substance may emanate from the main lesion causing a localized proliferation of melanoblasts elsewhere in the uvea.³

Two instances in which the main lesion was in the iris or ciliary body and

the lesser lesion in the iris serve to indicate certain characteristics. In the one case there was a malignant melanoma of the iris with four pigment freckles on the iris at the side opposite to the tumor. There were two small freckles on the fellow iris. The tumor was excised locally by Dr. John M. Wheeler and the microscopic diagnosis was malignant melanoma. Seven years have now passed during which time there has been no recurrence of the tumor nor have the pigment freckles, which were not excised, grown. This case bears out the fact that the freckles are composed of mature cells with little or no power of active growth. In the other case, a flat melanoma, measuring 1 by 3 mm., was noted in the periphery of the iris during a routine examination (fig. 7 a, plate 2). Presumably the lesion had been present for an indefinite length of time. Observations were made regularly every three to six months. Gonioscopic examinations, drawings, and photographs were made at varying intervals. No change was detected during the period of observation until after the passage of eight years, when it was noted with the gonioscope that the anterior chamber angle could no longer be seen over the site of the tumor, indicating an increase in elevation. At the same time two freckles appeared on the iris above the main lesion. These had appeared in six months' time. After two-and-one-half months more a third freckle appeared above the other two. The main lesion still measured 1 by 3 mm. The eye was enucleated. Microscopically, the tumor proved to be a malignant melanoma arising apparently from the site of a benign melanoma (fig. 7 b). The pigment freckles were composed of more matured cells than was the main lesion and seemed to represent multiple origins of the tumor (fig. 7 c). They appeared coincidentally with the active growth of the main lesion,

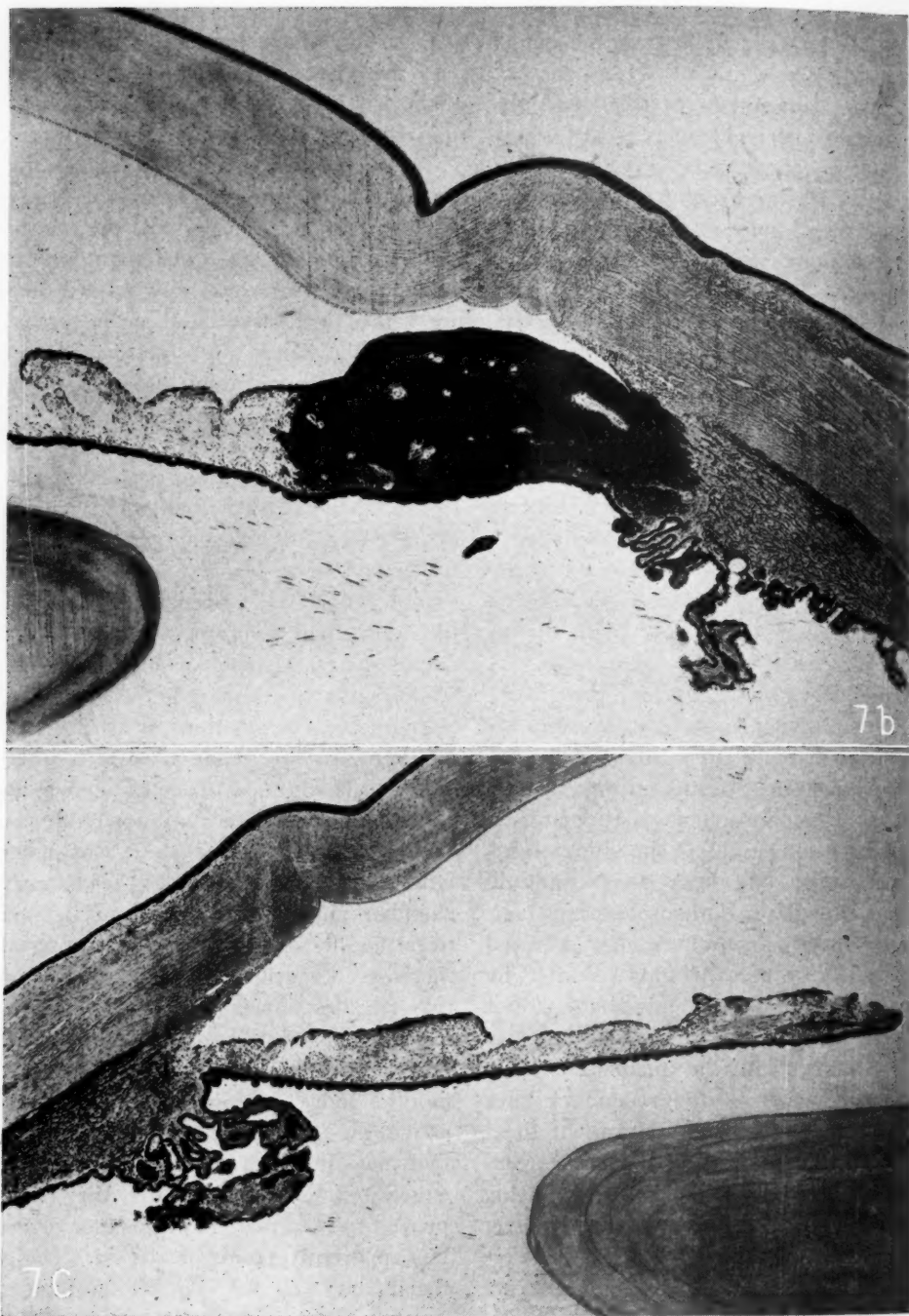


Fig. 7 b (Reese). Microscopic section of iris melanoma shown in figure 7 a. This is a malignant melanoma apparently arising from the site of a benign melanoma.

Fig. 7 c. Microscopic section through the freckle shown in figure 7 a.

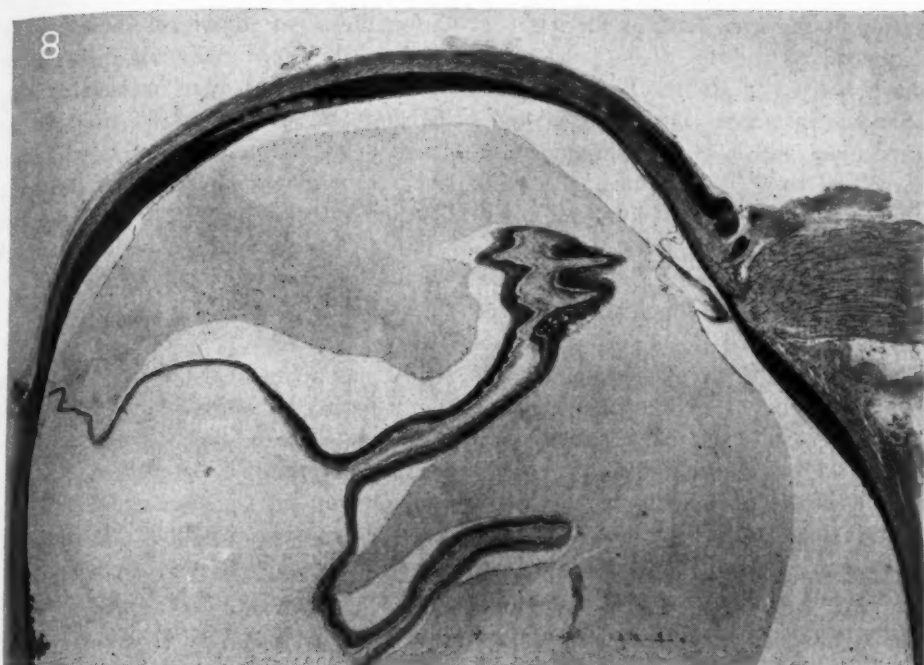


Fig. 8 (Reese). A diffuse malignant melanoma of the choroid which has extended out of the globe at the posterior pole. There is a detachment of the retina and secondary glaucoma.

which fact suggests that their appearance on the iris indicates active or malignant growth of the main lesion.

Relation of the iris melanomas to malignant melanoma of the uvea in gen-

eral. A malignant melanoma of the uveal tract is usually a localized tumor mass; occasionally, however, it manifests itself as a diffuse lesion involving sometimes the entire uvea (fig. 8). It may also appear as a diffuse lesion involving only a

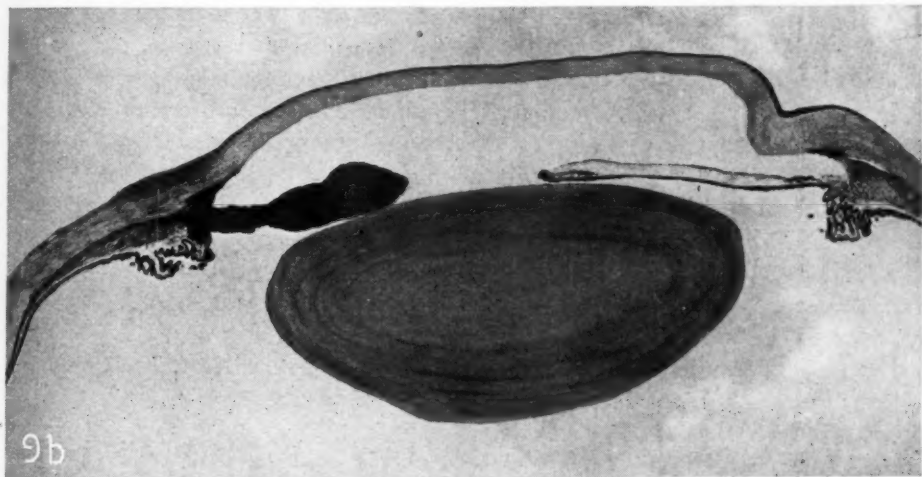


Fig. 9 b (Reese). Microscopic section of above case (line in figure 9 a indicates site of section).

portion of the uvea, such as the iris (fig. 9 a, plate 2, and fig. 9 b) and/or the ciliary body (fig. 6 b). The malignant melanoma occurring as a localized mass in the uvea, with benign melanomas elsewhere, seems to be the bridge or link between the usual type of localized malignant melanoma of the uvea and the diffuse malignant melanoma. The cancerigenic factor has its effect at a localized site alone (usual localized malignant melanoma of the uvea) and to a lesser degree elsewhere (malignant melanoma at one site and benign melanoma elsewhere), or in a diffuse manner over the uvea (diffuse malignant melanoma of uvea or iris and ciliary body, or ring melanoma). The ring nature of a melanoma seems to be due in part to multiple diffuse origins as well as to implantation growths which logically occur around the filtration angle where disseminated tumor cells in the anterior chamber would tend

to gather. An important difference between a localized malignant melanoma of the uvea with benign melanomas elsewhere, and a diffuse and ring type of melanoma, is that the cancerigenic agent had a malignant effect at one site and a benign effect elsewhere in the one case and a diffuse, multiple malignant effect in the other cases.

CONCLUSIONS

A malignant melanoma of the uvea may be accompanied by a single or by multiple benign melanomas. Such instances represent multiple origin of the tumor, and the iris is a common site for the benign feature. When the iris lesion is seen clinically it is a diagnostic aid.

I wish to express my appreciation of the assistance rendered by Miss Lilly Kneiske.

635 West One hundred sixty-fifth Street.

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- ³ Verhoeff, F. H. Personal communication.

SOLAR KERATOCONJUNCTIVITIS ASSOCIATED WITH AMBLYOPIA**

REPORT OF TWO CASES

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AND

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Although no reports have been found in a study of the literature concerning amblyopia associated with the exposure of the eyes to ultraviolet rays, the widespread use of ultraviolet-producing lamps makes it likely that more cases similar to those presented in this paper will be reported or have occurred.

Two brothers, J. H., and G. H., white, 23 and 26 years of age, respectively, purchased a small, inexpensive carbon-arc lamp which consisted of a reflector with two exposed carbons. With this lamp, they gave themselves three 15-minute periods of irradiation within 48 hours. The exposure was made with the patients seated about three feet in front of the lamp, facing it, with no protection for the eyes and with the eyes kept open most of the time.

Approximately six hours after the last exposure the patients complained of severe ocular pain, photophobia, and lacrimation. On January 25, 1939, six hours after the onset of the symptoms they were admitted to the New York Eye and Ear Infirmary. Examination of each patient showed slight redness and swelling of the eyelids with marked blepharospasm. There was profuse lacrimation and moderate diffuse redness of the conjunctiva. When the corneas were stained with fluorescein, a diffuse stippling re-

sembling superficial punctate keratitis was seen. Because of the intense photophobia and blepharospasm accurate determination of the visual acuity and satisfactory examination of the fundi could not be made.

Symptomatic treatment was administered, consisting of mydriasis with 2-percent homatropine, cold bathing, the use of boric-acid ointment, analgesics, and sedatives.

The following day the patients were comfortable but vision was reduced to the perception of hand movements. Examination of the fundi, while not entirely satisfactory, seemed to show no abnormality.

Two days after admission the pain, photophobia, lacrimation, and redness had completely disappeared, but the vision remained unimproved. A thorough fundus examination revealed nothing abnormal.

Peripheral visual fields were studied on the third day, January 28, 1939, using the Ferree-Rand perimeter. The vision of the first patient, J. H., was perception of hand movements. In testing his visual fields a 15-mm. white test object was used at 330 mm. with 7.5 foot-candles of illumination. The fields were reduced to a small temporal crescent in each eye (fig. 1.) On January 30th, the vision was the same and the fields unchanged. A light field was performed later on the same day, at which time vision had improved to the counting of fingers at 24 inches in each eye. The light field showed

*From the New York Eye and Ear Infirmary.

†Aided by a grant from the Ophthalmological Foundation, Inc.

a bitemporal hemianopsia (fig. 2).

On February 1, 1939, the vision was the same but the temporal crescents were larger when the visual fields were tested. The following day, vision had improved slightly and the visual fields had changed, the nasal field was beginning to be restored but there was still a large central scotoma (fig. 3). On the following day, February 3d, there was a return of vision (as tested with the pinhole) to R 20/100 and L 20/40 and the central and peripheral visual fields, as tested with the 3/330 white test object, were almost normal. On February 6th, the visual fields showed in the right eye, a relative central scotoma for blue of 4 degrees, with a marked contraction of the inferior temporal quadrant as tested with 1/750 white test object. The left eye showed a relative central scotoma for blue about 4 degrees and for green about 2 degrees with approximately normal fields (fig. 4).

Homatropine refraction was performed, and when the patient was last seen on February 21, 1939, the vision was: R.E. -4.00D. sph. \approx -.50D. cyl. ax. 30° = 20/20-2; L.E. -2.00D. sph. = 20/30; 300 mm. print could be read at 140 mm. with each eye.

The course of the second patient, G. H., and the visual-field changes paralleled those of his brother. On January 28 and January 30, 1939, the vision was reduced to perception of hand movements in each eye. The visual fields as tested with the 25-mm. white test object at 330 mm. showed only a temporal crescent to be present (fig. 5). The light fields taken on January 30, 1939, did not show the hemianopsia that was seen in the first patient but were more uniformly contracted. On February 1, 1939, vision was: R.E., the ability to count fingers at 8 inches; L.E., finger counting at 14 inches. The visual fields were quite uniformly and markedly contracted, but no central

scotoma was demonstrated with the size test object used (fig. 6). By February 3, 1939, the vision (as tested with the pinhole) was: R.E. 20/40-1 and L.E. 25/30; the central and peripheral fields, as tested with the 3/330 white test object, were almost normal. On February 6, 1939, the visual field showed an absolute central scotoma for green of 2 degrees in each eye and normal central fields as tested with the 1/750 white test object.

With the correction which the patient was wearing (R.E. -2.25D. sph. \approx -.25D. cyl. ax. 90° , and L.E. -2.25D. sph. \approx -.50D. cyl. ax. 90°), his vision was 20/20 in each eye.

In both patients, the general physical and complete neurologic examinations (except for the visual findings) showed no abnormalities. Roentgenograms of the accessory nasal sinuses and sella turcica were normal. Complete blood counts and urinalyses were within normal limits. The blood Wassermann reactions were negative.

Repeated fundus examinations, including one made with the binocular ophthalmoscope and with the red-free filter, showed nothing abnormal.

COMMENT

The carbon-arc lamp is a convenient source of ultraviolet radiation. This radiation depends upon the amount of current used and the type of carbon that is employed. The neutral (pure carbon) core carbon arc is rarely used. Carbons impregnated with "rare earth" oxides—yttrium and the like,¹ iron oxide, calcium oxide, and strontium—are used. In order to obtain sufficient radiation for effective therapeutics a lamp must be one of high amperage. In general, carbon-arc lamps give off radiations from 2,200 to 40,000 A.U.

For ordinary purposes it may be con-

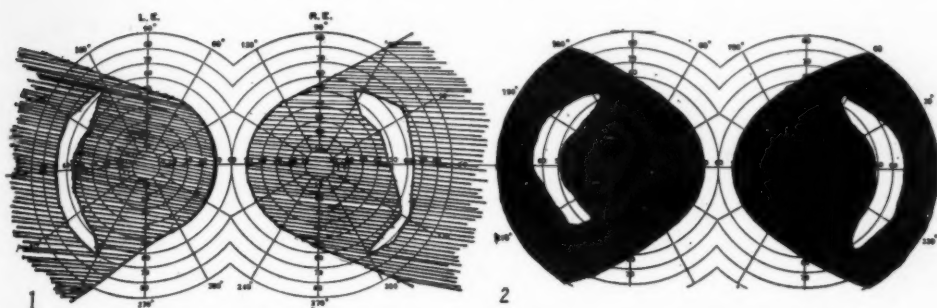


Fig. 1 (Berens and McAlpine). Mr. J. H., aged 23 years. Date: January 28, 1939. Vision without correction: R.E., hand movements; L.E., hand movements. With correction: R.E., fingers at one foot; L.E., fingers at one foot. Correcting lenses were worn during the test. Size of test object: R.E., 15 mm.; L.E., 15 mm. Illumination was 7.5 foot-candles.

Fig. 2. Mr. J. H. Date: January 30, 1939. Vision without correction: R.E., hand movements; L.E., hand movements. Size of test objects: R.E., 15 mm./330; L.E., 15 mm./330. Illumination was 7.5 foot-candles.

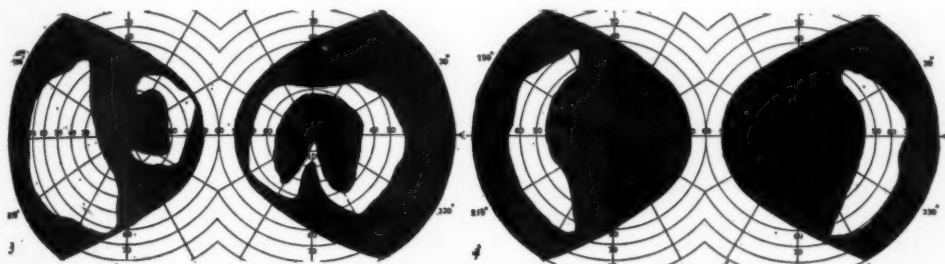


Fig. 3 (Berens and McAlpine). Mr. J. H. Date: February 2, 1939. Vision without correction: R.E., fingers at 2 inches; L.E., fingers at 3 inches. Size of test objects: R.E., 10 mm./330; left eye, 10 mm./330. Illumination was 7.5 foot-candles.

Fig. 4. Mr. J. H. Date: February 6, 1939. Vision without correction: R.E., fingers at 2 inches; L.E., fingers at 2 inches. Size of test objects: right eye, 15 mm./330; left eye, 15 mm./330. Illumination was 7.5 foot-candles.

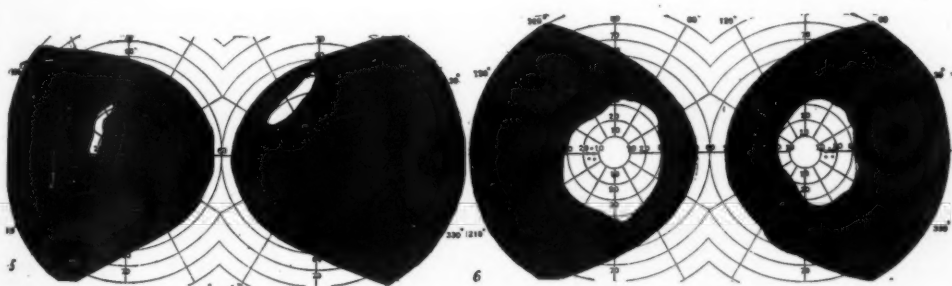


Fig. 5 (Berens and McAlpine). Mr. G. H., aged 26 years. Date: January 28, 1939. Vision with correction: R.E., hand movements; L.E., hand movements. Size of test objects: R.E., 25 mm.; L.E., 25 mm. Illumination was 7.5 foot-candles.

Fig. 6. Mr. G. H. Date: February 1, 1939. Vision without correction: R.E., fingers at 8 inches; L.E., fingers at 14 inches. Size of test objects: R.E., 15 mm./330; L.E., 15 mm./330. Illumination was 7.5 foot-candles.

sidered that radiations about 15,000 A.U. (infrared rays) are totally absorbed by the media of the eye. Below this the amount reaching the retina gradually increases, according to Hartridge and Hall, until at 9,000 A.U., 90 percent is transmitted. The high transmissibility is maintained through the visible spectrum, until 4,000 A.U. is reached, when absorption by the lens begins again. Absorption by the lens increases until at 3,200 A.U. transmission to the retina ceases.² It has been estimated that approximately 3 percent of the total heat incident upon the eye reaches the retina.

Another factor that determines the amount of incident energy to reach the retina at any one point is that of concentration. This depends upon the size of the source of energy and upon the dioptric system of the eye; the smaller and more concentrated the source the greater the concentration of energy at the retina in any one spot. Thus, retinal damage may occur without injury to the structures of the eye anterior to it.

The retina may be affected by light in one of three ways: There may be the sensation of vision; there may be a thermal effect; and there may be a chemical or abiotic effect. It may readily be seen how the first two take place, but the mechanism by which the latter occurs is more obscure. For practical purposes only rays below 3,000 A.U. may be considered abiotically active,³ and it has been shown that no rays below 3,000 A.U. reach the retina. However, it has been demonstrated by Duke-Elder⁴ that the abiotic effect in the retina can occur. It is probable that if this is caused by direct abiotic action the retina may be sensitized to rays longer than those to which it usually responds. Or it may be, as Birch-Hirschfeld⁵ suggests, that the changes are the result of an overstimulation of the physiologic mechanism of vision.

The literature concerning ultraviolet irradiation of the eyes is not extensive. Lear⁶ reported three cases of ophthalmia due to exposure to ultraviolet rays. He found a definite latent period (within 24 hours) between the time of exposure and the onset of the symptoms of pain and photophobia. The retina did not appear to be damaged in his cases.

Four cases of central retinitis from looking at a solar eclipse were reported by Makarov.⁷ He found that the scotomas appeared within 15 minutes, whereas the latent period in electric ophthalmia was much longer. In a detailed review of the literature, and a study of 11 cases caused by the solar eclipse in 1912, Klang⁸ found that in half of the cases there were central or paracentral scotomas, with denser central portions. He found that the ophthalmoscopic findings were not proportional to the visual disturbances, there being cases with scotomas but no fundus changes, and vice versa.

Epeleers⁹ made an exhaustive study of 13 cases of eclipse blindness during the summer of 1912. In 6 of these he found a ring scotoma, and in 11 there was a slight enlargement of the blind spot.

Four patients under observation by Carmazza¹⁰ showed, following observation of a solar eclipse, dark red maculas with radial gray striations, round white spots, and grayish surrounding retina. In three of the four cases all symptoms disappeared in a short time.

Ultraviolet irradiations of the eyes of rats by Reichling¹¹ produced severe reactions in the structures of the eye anterior to the retina but no mention is made of retinal changes.

Similar irradiation of rabbits' and guinea pigs' eyes by Rohrschneider¹² produced only corneal and lens changes.

It is probable, because of the relatively short exposure, that in the two cases reported in this paper temporary func-

tional changes in the retina or visual pathways resulting in contraction of the visual fields and temporary amblyopia were the result of the thermal action of the carbon-arc light. That this type of ultraviolet lamp may be sold over the counter without goggles or sufficient warning concerning the danger to vision is a condition which should be considered in the interest of the conservation of vision.

SUMMARY

1. Two brothers were exposed to an open carbon-arc lamp for three 15-minute periods within 48 hours. 2. Following

this, vision was reduced to the perception of hand movements and the visual fields to a temporal crescent in each eye. 3. There was gradual recovery in the course of 11 days, both of visual acuity and visual fields. 4. Consideration of effects of ultraviolet radiation make it probable that the contraction of the visual fields and temporary amblyopia in these patients were caused by the thermal effect of the carbon-arc lamp.

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LESS EVIDENT CAUSES OF LOWERED ACUITY IN SENILITY*

INCLUDING A DISCUSSION OF A CASE OF ENDOTHELIAL DYSTROPHY AS THE CAUSE OF
BULLOUS KERATITIS BY F. H. VERHOEFF, M.D., *Boston*

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Only those who have used the binocular corneal microscope of Csapsky, with its weak, diffuse illumination, can appreciate the genius of Gullstrand, who used the same binocular and by adding

It revealed details of corneal diseases that had previously escaped observation and diagnosis. Most of these triumphs concern younger persons, but the degenerative conditions of the postcorneal

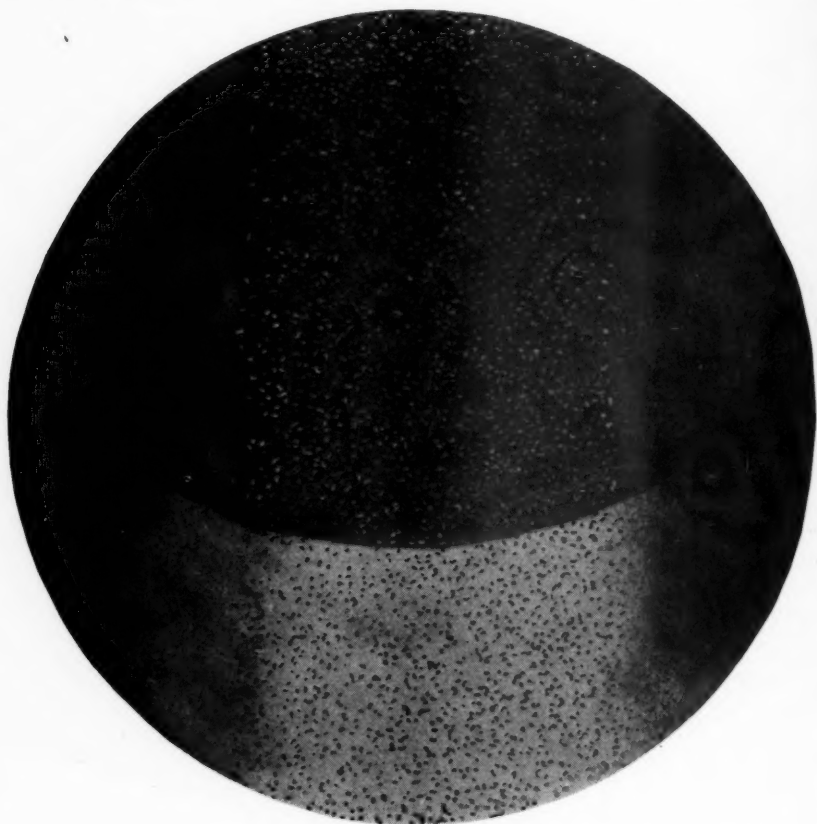


Fig. 1 (Lloyd). Myopia of 6 diopters. Vision but little affected. Tension at times a few points above the high limit. The fibrin bits are numerous and, although they appear here as if limited to the central zone, are easily seen everywhere if the light is shifted.

the slit of light made the instrument next in importance to the ophthalmoscope.

* Read before the American Ophthalmological Society at Hot Springs, Virginia, June, 1943.

endothelium are peculiar to older patients. Pigmented dots in varying number may be seen upon the posterior corneal surface of many older patients by

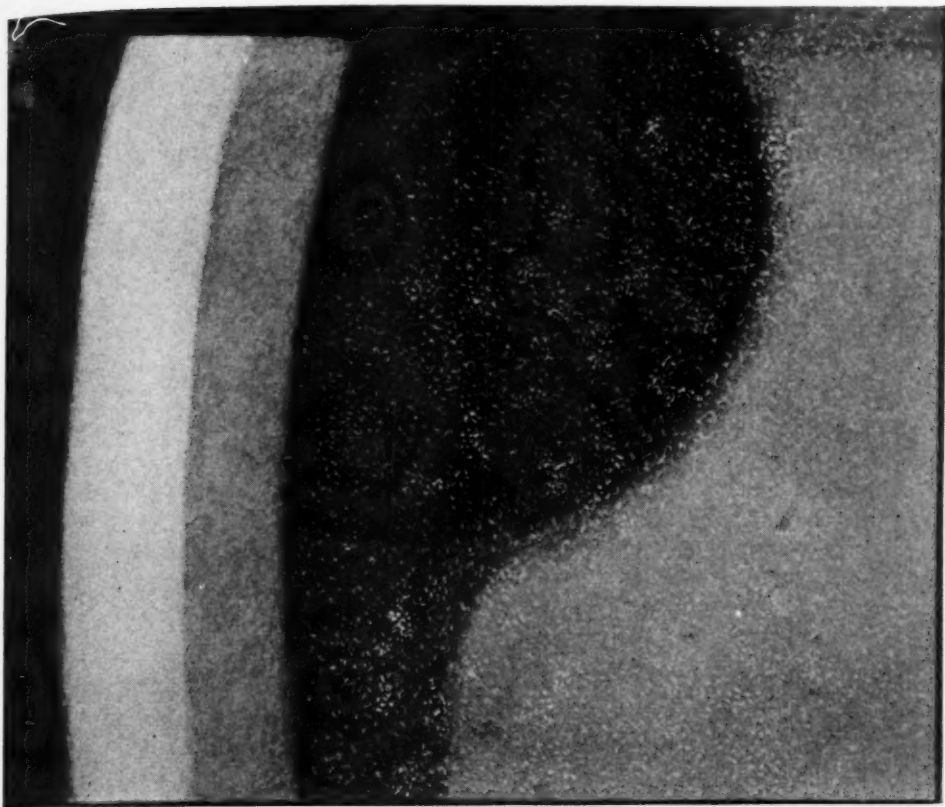


Fig. 2 (Lloyd). Cornea farinata. Hyperthyroid, appearance sudden, moderate effect upon the vision. Lens changes followed in a few months.

retroillumination, but the eyes function well and the patient enjoys good vision. These deposits may increase in number or change in character, especially after cataract extraction, but even then cause no fears for the future of the eye. In some cases, with profuse discrete deposits, there is lowered acuity and occasionally slight rise of tension. After successful trephining, pigmented bits are deposited in large numbers on the posterior corneal and lenticular surfaces, with formation of synechiae and, although the distance vision may fall perceptibly, reading ability may be satisfactory. Forward movement of the lens and early cataractous changes are associated features, but the source of the deposits is

unexplained (figs. 1, 2, 3). A cloud of pigmented bits is an unfavorable omen in cases of diabetes, hyperthyroidism, or presenility.¹ An advanced state of this form of postcorneal pathology is the cornea guttata which Vogt asserts is the early stage of Fuchs's dystrophy.² This slitlamp picture is very clear, showing droplets and pigmented bits on the posterior surface and an increase in the number of Henle's warts.^{3, 4} There seems to be an endothelial degeneration which allows the aqueous to seep into the deeper layers of the cornea with subsequent trophic changes that feature Fuchs's dystrophy. The epithelium becomes edematous, sensation is lowered, and the cornea cannot withstand the ordinary ex-

posure of daily life. Minute pockets of fluid in the edematous epithelium tend to coalesce, forming blisters that become infected when the cover is lost, and the eye is ruined unless new tissue is formed be-

under the microscope and found the endothelial defects which permitted aqueous infiltration into the corneal stroma.

Dr. Verhoeff has sent me the following description of an unpublished case of



Fig. 3 (Lloyd). Slitlamp view of cornea guttata in a woman aged 74 years. Moderate reduction of vision, eyes uncomfortable.

neath the epithelium.^{5, 6, 7, 8} Protective devices may prevent ulceration and secondary infection, but, in any event, vision is very poor. In the early stage these patients may say vision is poor upon awakening but improves after being up and about. This improvement is due, apparently, to massage of the edematous epithelium by the upper lid. As is well known, each of these cases is one of potential glaucoma. Vogt studied such eyes

epithelial dystrophy in which he examined the eye microscopically 17 years ago: "The patient, then aged 75 years, was brought to me in 1926 by a young colleague. The left eye showed a typical picture of Fuchs's epithelial dystrophy. Its vision was markedly impaired, and there were mild symptoms of irritation. The other eye was slightly, if at all, affected. The irritation increased, and, finally, about six months later, became

so severe that my colleague removed the left eye and sent it to me for microscopic examination.

"A median vertical section of the cornea showed these changes: From the

and, where covered with 'endothelium,' was sharply defined. Near the center of the cornea, for a stretch of 3 mm., the 'endothelium' was entirely absent, and here the surface of the new layer of

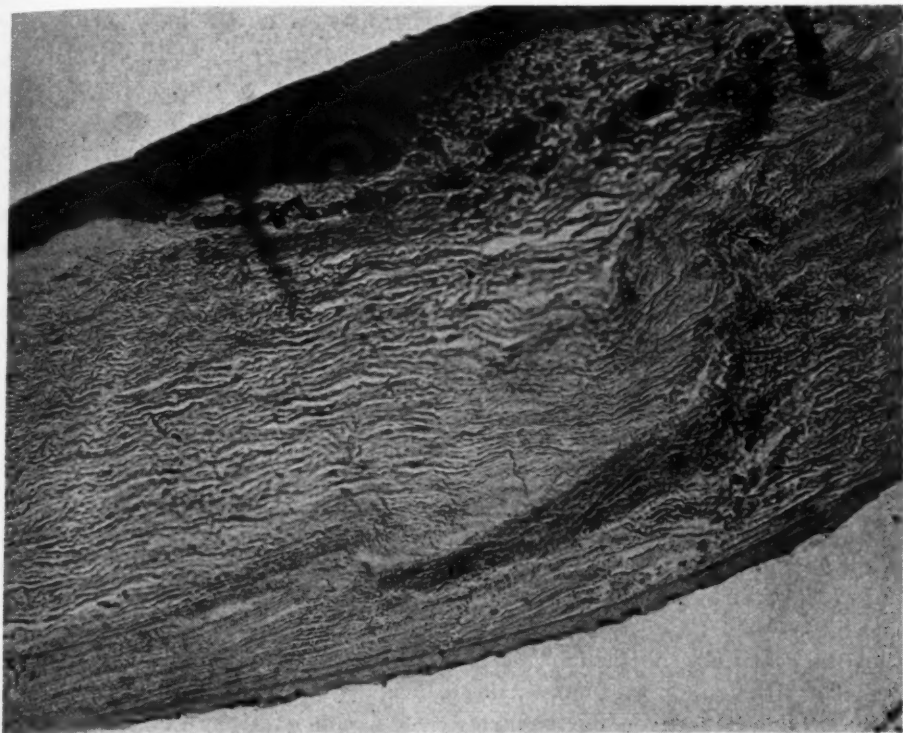


Fig. 4 (Verhoeff). Section of cornea. Case of epithelial dystrophy. Upper periphery of cornea, showing small warts on Descemet's membrane and small defects in the abnormal endothelium. Elsewhere the changes were different and much more marked.

periphery above, for a distance of 0.75 mm. Descemet's membrane was slightly thickened and showed many warts, most of them small. Beneath it the 'endothelium' was greatly altered, and in minute areas, absent (fig. 4). Elsewhere there were no warts. At the periphery below, the 'endothelium' was completely absent for a distance of 0.75 mm. Behind most of the cornea, an additional layer of Descemet's membrane had been formed, about one half the thickness of the old. This was composed of an almost transparent substance that stained feebly

Descemet's membrane was fuzzy. Elsewhere the new membrane was largely covered with 'endothelium' which, however, was abnormal in that the nuclei were scanty, thin, and elongated. Probably the 'endothelium' had previously been lost here, and then poorly re-formed.

"On the anterior surface of the cornea, the epithelium was intact but, just below the center, was characteristically thickened as in bullous keratitis, and separated from Bowman's membrane in the form of a large flat bleb. Here, immediately beneath Bowman's membrane, were two

nodules, produced by proliferation of the corneal corpuscles. Each was about 0.25 mm. in diameter, and 0.12 mm. in thickness. In this region, in the middle layers of the stroma, there were a few fairly large blood vessels. From the corneal limbus below, fine vessels had extended for a distance of 0.75 mm. between the epithelium and Bowman's membrane—the merest trace of beginning pannus degenerativus.

"The eye showed no evidences of glaucoma—there were no peripheral anterior synechiae, nor was there the slightest cupping of the optic disc. The retinal ganglion cells were intact. The choroid showed very slight sclerosis of its vessels, and insignificant infiltration with lymphocytes. Otherwise the eye was normal except for common senile changes; notably, hyaline degeneration of the ciliary processes, and marked proliferation and degeneration of the pigment epithelium behind the macula.

"From these findings, I attributed the epithelial dystrophy to the changes in and loss of the corneal 'endothelium.' The 'endothelial' changes seemed to me analogous to senile changes of the pigment epithelium. First there had occurred senile hyperplasia of the 'endothelium,' producing in places a new layer on Descemet's membrane, and then degeneration with final denudation. No doubt, even before the denudation occurred, the altered 'endothelium' permitted the aqueous to permeate the cornea and affect the epithelium.* Finally the process led to bullous keratitis with secondary vascularization of the cornea. This case proves that formation of warts is not essential to the process—the hyperplasia of the endothelium may produce, not warts, but

duplication of Descemet's membrane. In this connection it is to be noted that just as colloid excrescences of the pigment epithelium may occur in young adults, so may cornea guttata. Whether the latter always ultimately produces epithelial dystrophy, I do not know, but certainly many years may elapse before it does so. Of course, the epithelial dystrophy is produced neither by warts nor by duplication of Descemet's membrane, but by the associated alteration of the 'endothelium,' and by this alteration only when it has become severe. No doubt, no two cases would be exactly alike in respect to the endothelial changes. The important fact is that epithelial dystrophy is produced by a degenerative change in the endothelium. Usually, this can be regarded as atrophic, even when the eye is not otherwise senile, but probably in some cases it is secondary to other changes in the eye. Any type of cataract operation injures the endothelium, more or less. In some cases, for unknown reasons, the injury is never fully repaired and epithelial dystrophy results. In some cases, the epithelial dystrophy is probably due to persisting contact of the vitreous and cornea. The reason why 'endothelium' is inclosed in quotation marks is because it is not really endothelium but 'mesenchymal epithelium.'"

Only the early stages of Fuchs's dystrophy are likely to escape notice. The first objective signs are anesthesia of the cornea with edema of the surface epithelium. Which comes first is a question, but the patient's attention is attracted by fading vision. There are no early characteristic symptoms of this syndrome but it is rarely seen in satisfactorily functioning eyes. The stubborn and troublesome group of symptoms usually diagnosed chronic catarrhal conjunctivitis, requires careful study to avoid missing early

* D. G. Cogan (Arch. of Ophth., 1941, p. 941) has satisfactorily explained how, under such conditions, vesicles and bullae are formed.

Fuchs's dystrophy (cornea guttata) and keratitis sicca (keratitis filamentosa). Treatment is fruitless and vision is lost as new tissue forms a protecting barrier beneath the epithelium (fig. 5). Fuchs has

tension and careful observation afterward. If there is the slightest evidence of elevation of tension, a trephining should be done with complete iridectomy. If the eye reacts well, the extraction

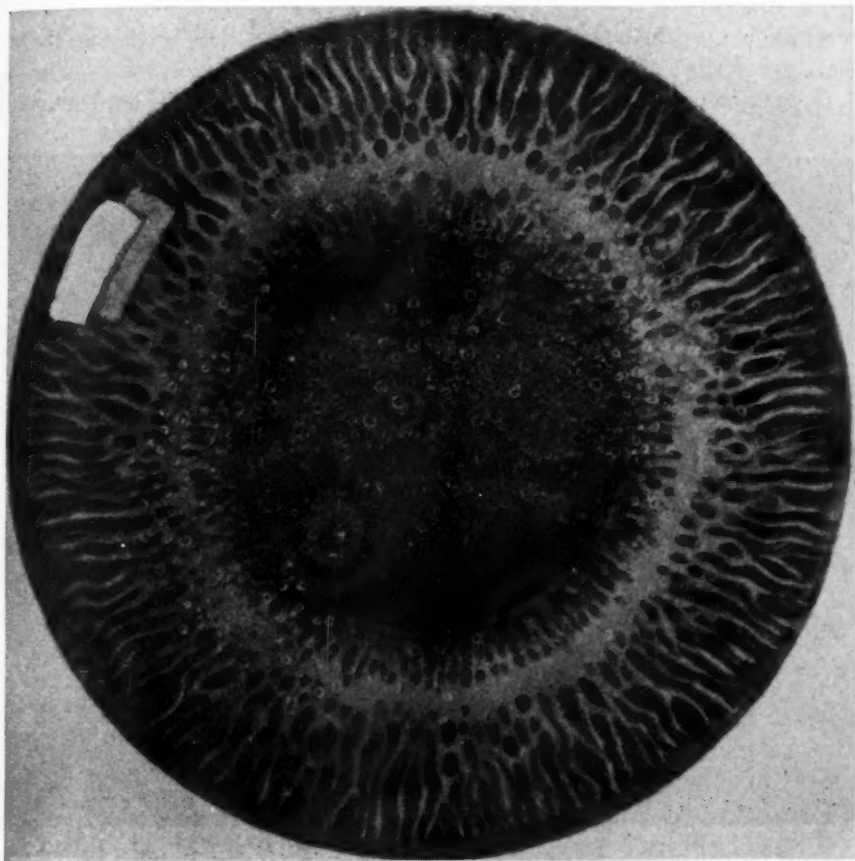


Fig. 5 (Lloyd). Slitlamp view of Fuchs's dystrophy in the early stage of epithelial edema.

reproduced this condition in animals by irrigating the anterior chamber, but that cannot explain the occurrence after cataract operation, when no irrigating has been done, irrespective of the type of operation.

Slitlamp study is a part of the routine before cataract surgery, and if cornea guttata is found, the operation should be performed with preliminary taking of the

should follow. If, later, this eye develops the characteristic changes of dystrophy with elevation of tension, the second eye should be operated on, despite the gloomy outlook, unless the changes in the corneal surface have already appeared. Measures to overcome rise of tension should be undertaken on the slightest provocation. Fortunately, many of the patients who have bedewing of the posterior corneal

surface, escape further trouble. In some, the changes are unilateral, at least for some years. It may seem that too much stress is placed upon the tension element, but the onset is so gradual that it may be overlooked at the time when treatment can give results.

A very similar corneal dystrophy occurs after cataract surgery (fig. 6). Whether this is latent Fuchs's dystrophy stirred

of fundus lesions escape the hand-scope now in common use. Red-free light and binocular ophthalmoscopy supply useful details in certain cases, but it would seem as if the limit of efficiency had been attained in this particular direction.

Until direct examination was made the easier of the two methods, there was room for difference of opinion as to many fundus cases. The better instru-

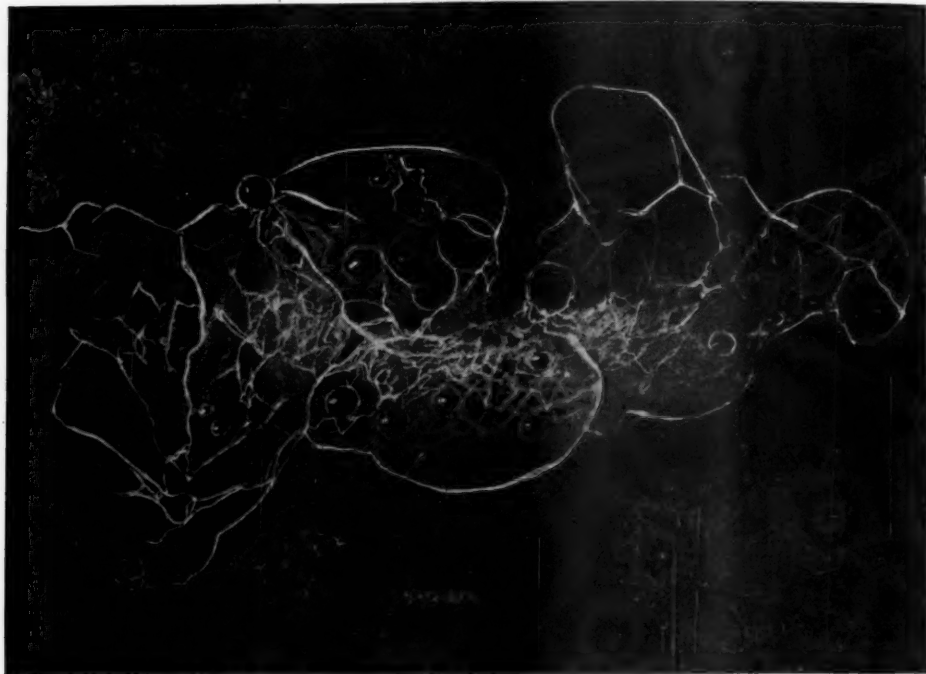


Fig. 6 (Lloyd). Epithelial dystrophy after operation for cataract. Advanced stage. Patches of edema with large irregular bleb.

into activity, or whether it arises *de novo* after operation, is not yet clear. Dr. Verhoeff's comment on this question is most illuminating and practical.

The ophthalmoscope came into use in 1851. It made ophthalmology a specialty and became at once the most important of our diagnostic instruments. About 25 years ago, the electric lamp was arranged for its illuminating system, making such an effective instrument that only details

ment and the pathologist have cleared up many hindrances to correct diagnosis, but many eyes with unusual lesions do not come to the laboratory, so our knowledge is not so positive as we would like. It behooves us to collect and compare our case reports, in order to create a reliable and informing literature.

An unobtrusive fundus picture seen among our older patrons is ushered in by high reflexes in the macular area (fig. 7).

The choroid looks "meaty" and the retinal capillaries are tortuous. The vision may be almost normal, although to the examiner's eye the retinal surface throws a sheen like watered silk. The binocular ophthalmoscope will show the uneven surface of the retina as the finer vessels cross the affected area. When the sheen is very strong, the vision falls and red-free light shows this flare to be a lacy film in the retina. A few of these eyes under observation have developed a hole in the macula after slight accidents or spontaneously.

This condition has been seen in diabetes, and vitamins A and B seem to be of definite value. They were prescribed to supply the deficit occasioned by elimination of starch and sugar from the diet and the diabetic's inability to use fats. Other patients get along as well with or without vitamins. I do not know of any eyes of this type examined by the ophthalmoscope and later by the pathologist. Judging from Kuhnt's description⁹ and the later appearance of the hole in the macula in these cases, this is probably the rarefying atrophy of the retina he described. While this change is going on, it is not unusual to see a thinning of the tapetum in the nasal fundus, exposing the deeper choroidal vessels with early sclerotic changes here and there.

Another senile change in and about the macula is the appearance of small pigmented spots in the macula some time after the patient has complained of a feather or a "bug" near the fixating point. At first, the annoyance occasioned is out of proportion to the effect upon the patient's ability to read test type, but later a definite scotoma appears with corresponding loss of vision. It is doubtful if the pigment spots which eventually may be very clearly seen in the macula are causing the loss of vision; they may rather be an indication of disease in the

pigment layer and in the rods and cones, of which process the pigment is a by-product. Both eyes are usually affected but the disease may appear in one eye first or make more rapid progress there. This condition has occurred in patients with failing memory, mental and physical



Fig. 7 (Lloyd). Fundus of an elderly person with retinal reflexes, tortuous finer vessels in macular area and "meaty" choroid. After a slight head bump, the hole in the macula appeared.

deterioration usually called "softening of the brain." Similar macular defects occur in cases of cataract. If the lesions develop after the operation, the loss of central vision may precede the objective signs. If the defects are found after a successful cataract operation, the question may arise whether they are also present in the eye that has not been operated upon. The light-projection test will not decide this, but the patient must always be given the benefit of the doubt.

The original technique of perimetry was so tedious and the value of colored test objects so questionable that the natural preference for objective evidence led to relegation of the procedure.

Bjerrum introduced his system of quantitative perimetry and campimetry

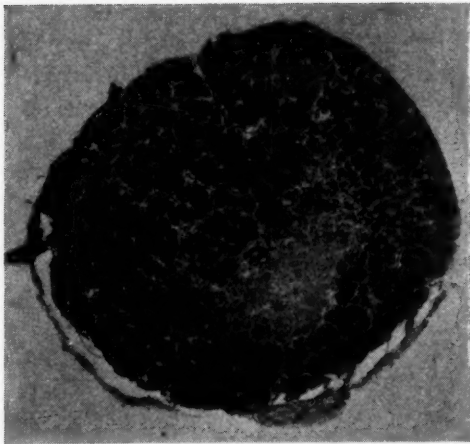


Fig. 8 (Lloyd). Patch of degeneration in optic nerve of an aged person (Fuchs. Arch. f. Ophth., 1920, v. 103. Ueber senile Veränderungen des Sehnervens).

with serial white test objects in 1889, but some years passed before the idea reached us. The first Bjerrum scotoma reported in our ophthalmologic literature is the work of Dr. Harry Friedenwald in 1902. Dr. Luther Peter's campimeter imposed a practical demonstration that the field defects of glaucoma had been missed entirely because the profession insisted upon using the perimeter for purposes it could never satisfy. The Bjerrum method

placed glaucoma diagnosis upon a scientific basis and provided a practical technique for general use.

Perimetry is of greatest value in demonstrating and localizing lesions behind the globe. Lesions anterior to the optic thalamus have an effect upon the optic disc, but the farther back the lesion, the later does the atrophy appear. There are diseases along the optic pathways behind the globe which have no effect upon the disc but few of these belong to the group we are discussing.

Although the effects of entanglement of the chiasm under tension in the circle of Willis have been well studied in pituitary disease, this peculiar complication was more recently recognized in tumors of the brain with distention of the third ventricle pressing upon the chiasm from above.¹⁰ Demonstration of local pathology in the optic nerves of older patients and the pernicious effects of pressure by sclerosed members of the circle of Willis was the work of Fuchs and Liebrecht.^{11, 12} Fuchs examined the optic nerves and chiasms of a group of old persons and found amyloid deposits among the nerve bundles, patches of fibrosis in the nerves, and pressure damage at the inner margin

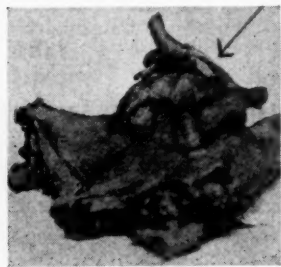


Fig. 9

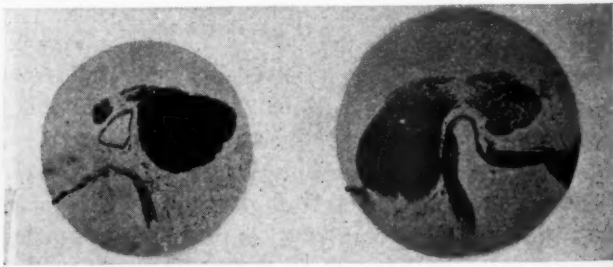


Fig. 10

Fig. 9 (Lloyd). Showing the optic nerves under pressure by ophthalmic arteries at entrance of optic foramen. Arrow points to anterior communicating artery which may indent the chiasm and damage the papillomacular bundle crossing (from Liebrecht. Sehnerv und Arteriosclerose. Arch. f. Augenh., 1902, v. 44).

Fig. 10. Left, temporal section of optic nerve damaged by pressure of ophthalmic artery. Right, optic nerve divided by pressure of rigid carotid and ophthalmic arteries (from Liebrecht. Arch. f. Augenh., 1902, v. 44).

of the optic foramen where the nerve was pressed against the fibrous margin of the canal entrance by the sclerosed ophthalmic artery. Liebrecht made extensive studies along the same lines and found the patchy degeneration in the nerves between the chiasm and the globe (figs. 9, 10). He also found the damage described by Fuchs at the entrance of the optic nerve into the optic canal, and advanced changes where the anterior cerebral artery and the ophthalmic artery, branching from the carotid, had indented the nerve near the chiasm. The one thing we lack is a systematic examination of such eyes in life as well as the pathologist's report. There are none of these available, so far as I know, and we are not in a position to say that a certain visual-field defect in an older person is caused by a certain patch of sclerosis in the macular bundle of an optic nerve or pressure of a sclerosed artery at a certain place in the

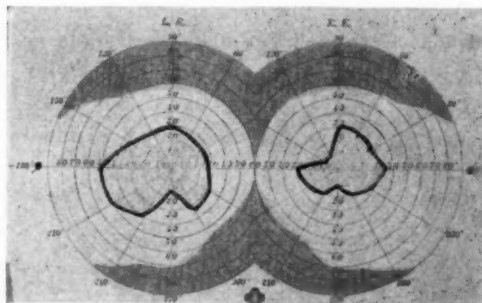


Fig. 11 (Lloyd). Vision with correction 15/30 and 15/20 despite very contracted fields. Fundus negative except the ordinary changes of vascular sclerosis in moderate degree.

cranium near the chiasm. Comparison of field defects in pituitary disease, chiasmal arachnoiditis, and brain tumors with those found in old people explain many cases formerly quite blank. Older people often complain of difficult vision but may read Snellen and Jaeger test type very satisfactorily. The fundus gives no clue

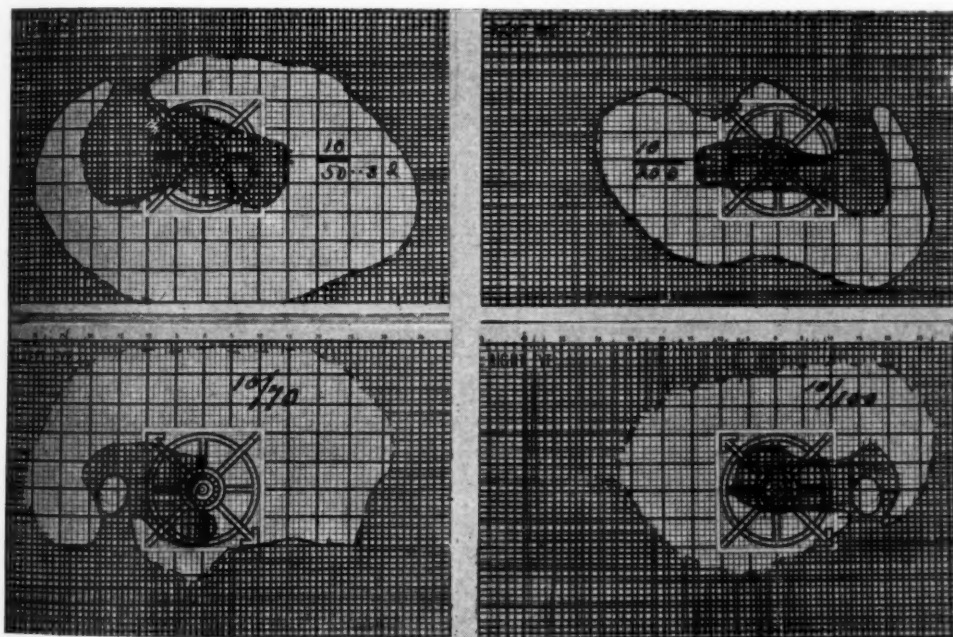


Fig. 12 (Lloyd). Contracted fields with central scotomas in older persons. Vision 10/50 and 10/200; 10/70 and 10/100.

whatever but the visual fields are very much contracted and the blind spots enlarged (figs. 11, 12). These patients are usually angiosclerotics and not infrequently are victims of vascular accidents

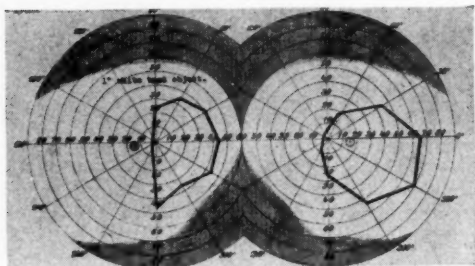


Fig. 13 (Lloyd). Left homonymous hemianopia came on during sleep without other complaints than difficult vision. O.U. 20/20 less a few letters with correction. One degree white test object.

later. Central vision may fail later and then, in addition to the contracted fields, there is a central scotoma extending from the blind spot to and including the fixating area, later to break through to the periphery, above or below the blind spot. The sclerosed ophthalmic artery pressing against the optic nerve may explain the constriction of the field, but the most reasonable explanation of the bilateral central scotoma is a patch of sclerosis in the center of each papillo-macular bundle. The cases with progressive atrophy of the nerve of one or both eyes would fall into the group of lesions caused by pressure of the carotid artery and its branches or to extensive degenerations extending up or down in both optic nerves.

Knapp¹³ has discussed another phase of this condition with atrophy of the optic nerve, bizarre field defects, and cupping of the discs but without elevation of tension. This problem vexed von Graefe and Donders, who did not have reliable tonometers nor local anesthetics. When tension was evident to the fingers, it was called glaucoma simplex, but otherwise

it became cupping of the disc with amblyopia. Bjerrum demonstrated that careful field taking in many of these cases revealed the typical defects of glaucoma despite the low tension. Effort has been made to show sclerosis of the circle of Willis by the X ray, but the results are not satisfactory as yet.

Hemianopias caused by vascular accidents behind the thalamus have been studied in life and also in the laboratory. They have been consistently overlooked in practice since the practical Bjerrum technique came into use, because of the fixed idea that these defects are rare and cannot exist unless the patient has been seriously ill, or has lost much of his vision. Hemianopias due to lesions in the right optic radiation behind the thalamus can occur without loss of central vision, without illness, and with little inconvenience to the patient except that he cannot see well but does not know why. Any patient who has been in coma from whatever cause (uremia, apoplexia, sleeping sickness, difficult nitrous oxide anesthesia, or carbon-monoxide poisoning), especially an older person, may upon awakening complain vaguely of his vision, which should occasion a field study. The most common apoplexies concern the arteries of the internal and external capsule, but hemianopia is not a symptom of this anterior lesion. The most common hemianopias are due to lesions of the branches of the posterior cerebral artery. Lesions of the Sylvian artery may produce aphasia and disturbances of memory, but there will not be hemianopia unless the deep terminal branches are also involved. It is most desirable that we add to our clinical knowledge of lesions involving the optic radiation and its cortex; the greatest need, however, is to make our literature truly scientific by thorough study of the fields and vision of older patients in institutions where

autopsies are permitted and where there is an adequate staff of special examiners. At this time, all of our institutions lack sufficient help, but the return of peace may permit resumption of the many avocational activities of our medical men, of which the public knows nothing.

I would like to emphasize the statement that hemianopias are not uncommon,

that they occur without serious illness, and that the patient's complaints may be vague and seemingly unimportant. The vision may be 20/20, or nearly so, and any vascular incident, however insignificant, should suggest study of the visual fields.

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CANCER OF THE EYELID*

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GENERAL CONSIDERATIONS

Cancer of the eyelid is a frequent disease. In a group of 2,601 patients suffering from cancer of the skin in one form or another and treated at the Pittsburgh Skin and Cancer Foundation, 239 had cancer of the eyelid. Thus, in an unselected group of patients suffering from skin cancer, cancer of the eyelid occurred in 9+ percent of instances.

Like tumefactions in any other location, cancer of the eyelid presents its own particular problems. These include that of diagnosis, of prognosis, and of therapeutic approach. It is the last-mentioned consideration, however, which most interests both patient and physician and affects the problems of diagnosis and prognostication.

The goal of treatment is the complete eradication of the new growth. This is to be accomplished in the shortest possible time, with the least amount of inconvenience to the patient, and with as little damage as possible to the eyeball, the tear ducts, and to the lids themselves, so as not to interfere with the ease, comfort, and function of all these structures. To take care of all of these contingencies it is of inestimable value that a variety of procedures is available for the purpose of complete destruction of a new growth.

These procedures include both surgical and nonsurgical methods. Surgical procedures consist of: 1. Ordinary excision.

*From the Pittsburgh Skin and Cancer Foundation.

2. Removal with the so-called radio-knife.
3. Destruction of the tumor by electro-desiccation or electrocoagulation.

The nonsurgical field offers: 1. A variety of modalities of X ray: a. Superficial. b. Contact. 2. Radium: a. Topical application. b. Insertion of emanation or radium needles.

PURPOSE OF COMMUNICATION

The purpose of this communication is to discuss the methods of treatment and to endeavor to show both by illustration and statistical evaluation the irrefutable fact that it is not a particular method of treatment which determines the ultimate result, but that, in the final analysis, it is the adaptation of a procedure to the patient rather than the opposite which must be foremost in the mind of the physician.

In the accumulation of the material for this report only 125 of the 239 cases were finally chosen, chiefly because of incomplete histories and the absence of follow-up. Although this number is small, it serves to emphasize the previously stated therapeutic axiom.

ANATOMIC CONSIDERATIONS

Delineation of the scope of the location of eyelid cancer was accomplished by the utilization of the fact that adipose tissue is not found ordinarily in eyelid structure.

Eyelids comprise the two thin movable folds of skin and mucous membrane in front of the eyeball and are placed there for such protection as they may offer

against injury, foreign bodies, light, and the like, this protection being accomplished by their closure. Eyelids are composed of the following structures: The skin, areolar tissue, fibers of the orbicularis oculi muscle, tarsus, tarsal glands, and the mucous membrane, the conjunctiva itself. The upper eyelids contain, in addition, the aponeurosis of the levator palpebrae superioris muscle. The skin covering the eyelids is very thin and extremely flexible. The junction with the mucous-membrane layer of the palpebral conjunctiva is more acute than are similar junctures at the vermilion border of the lips and about the mucocutaneous junction of the external genitalia and the anal orifice. However, this mucocutaneous "seam" of the eyelid does not seem to be as frequently the site of malignant cellular changes as are those in the other locations. Within the skin itself we find the usual appendages, sweat and sebaceous glands, hair follicles from which grow lanugo hairs, and also the short, thick outward-curving cilia. The subcutaneous tissue is referred to as being areolar. It is loosely and delicately constructed and, as previously stated, it does not ordinarily contain fat, and is thus used as definitive in determining the extent of the eyelids themselves.

Likewise the palpebral commissures, both inner and outer canthi, are important delineating landmarks. Tumors located at the inner canthus, one of the most common sites of eyelid cancer, were found to extend over the side of the bridge of the nose rather than to extend toward the tarsal plate of the eyelid. Here again it was noted that the thin loose areolar skin without fat marked the scope of the rigid portion of the eyelid as it extended over the bridge of the nose. Thus, to recapitulate, cancer of the eyelid was considered as such when it was apparent that it arose from that portion

of the skin and mucous-membrane fold which contained no fat in the subcutaneous structures.

Cancer may occur at any portion of the eyelids, upper or lower, or at the inner or outer canthi. The distribution of cancers in the 125 patients under consideration was as follows: 17 on the upper eyelid, 47 on the lower eyelid, 52 at the inner canthus, and 9 at the outer canthus.

MORPHOLOGIC CONSIDERATIONS

The tumors varied considerably in their appearance. Some were but small nodules which protruded from an unaltered skin surface, enlarged very slowly, and could be recognized as cancers only by the fact that they were extremely hard. Some of the tumors were similar to those just described and varied only because of the atrophy of their covering epidermis. In some instances the normal skin tone was replaced by a waxy sheen which was soon recognized as being as pathognomonic as the stony hardness of carcinoma. In a number of instances the surface of the tumor was traversed by newly formed telangiectasia. Another type of tumor surface appeared studded by warty excrescences. In this type, usually because of the difficulty of removing the accumulated soiled epidermal debris, the lesion was discolored, grayish black, or it assumed a completely darkened appearance. In some of the tumors localized necrotic areas were predominant features. One or more small or large, deep or shallow, and usually uneven ulcerations were present, covered by a loosely glued various-colored encrustation. In the larger tumors, where localized cellular death had assumed larger proportions, the entire tumor area was at times destroyed, and the encrustation hid from view the base of the entire ulcer. Dependent on the amount of bleeding



Figs. 1-10, 13-22 (Hollander and Krugh). For Figs. 11, 12 and explanation of all figures, see next page.



Figs. 1 to 22 (Hollander and Krugh). Tumors of the eyelid.

Fig. 1. A fleshy carcinoma of the lower eyelid, showing warty excrescences on the surface.

Fig. 2. A somewhat rapidly growing carcinoma of the lower eyelid, deeply infiltrated, hair-matrix-cell type.

Fig. 3. A small epidermoid carcinoma of the upper eyelid. This tumor metastasized through the lymphatics and death resulted from this metastasis.

Fig. 4. An extensive hair-matrix type of carcinoma of the upper eyelid.

Fig. 5. An extensive epidermoid carcinoma which began at the inner canthus.

Fig. 6. A basal-cell type of carcinoma at the inner canthus which invaded the underlying structures and caused death by this extension.

Fig. 7. A deeply infiltrating epidermoid carcinoma of the outer canthus which caused death by extension.

Fig. 8. An extensive basal-cell type of carcinoma starting at the inner canthus and extending over the skin surface of the face, treated with 10 doses of superficial X ray.

Fig. 9. End result.

Fig. 10. Epidermoid carcinoma at the inner canthus and lower eyelid.

Fig. 11. Showing described eye shield in place.

Fig. 12. Showing contact X-ray-therapy machine in position (Chaoul tube).

Fig. 13. End result.

Fig. 14. Basal-cell type of carcinoma at the inner canthus.

Fig. 15. After 10 consecutive contact X-ray treatments, using the special eye shield.

Fig. 16. End result.

Fig. 17. Epidermoid carcinoma involving lower eyelid.

Fig. 18. After excision and surgical repair.

Fig. 19. Basal-cell type of carcinoma of the inner canthus.

Fig. 20. After surgical removal and pedicle-graft repair.

Fig. 21. Basal-cell carcinoma of the inner canthus extending over the nose.

Fig. 22. After surgical removal and pedicle graft repair.

that occurred through erosion of the superficial vessels, the color of the crust would vary. This encrustation, when it became heavy, would exfoliate of its own accord, expose the underlying ulcer bed, and then re-form as the drying effect of the atmosphere would concentrate suppurative, hemorrhagic, and necrotic material into a semisolid, loosely adhering but pliable surface cover. These processes of crust formation, exfoliation, and re-formation would follow each other at irregularly spaced intervals. Sometimes,

due to injury of some type or other or just because of the spreading necrotic process, minor hemorrhages would occur, and as they lasted shorter or longer periods the tinctorial effect on the overlying crusted structures would manifest itself in various degrees. Some of the tumors had a fleshy appearance, the surface being irregular because of retractions occurring at unexpected locations. In one instance a black-pigmented, shiny, flat nodule occurred about the center of the lower eyelid. The ominous black fore-

told the seriousness of the condition, for it proved to be an example of melanocarcinoma, the most dangerous and almost always fatal type of new growth.

DIFFERENTIAL DIAGNOSIS

It is apparent from the perusal of the foregoing description that eyelid cancer has a multiform appearance, and clinical differentiation from tumefactions other than cancer is essential.

Pigmented hairy moles offer difficulty only from the standpoint of differentiating them from melanocarcinomas. One can depend on the admixture of brownish color and presence of the hair-bearing areas as points against malignant melanotic tumors. Especially the latter point, the presence of hairs over the surface of the tumor, is of inestimable value in this differential diagnosis. Melanocarcinomas, as a general rule, do not present such hair-bearing areas.

Vascular tumors, such as the ordinary variety of hemangiomas, may confuse the issue only until their composition of vascular structure is ascertained.

Small warty excrescences, the so-called filiform warts, occur with great frequency in older individuals. These little tumors are usually multiple and appear as pouchlike prolongations of various size. The important physical sign is the absence of hardness. It is supposed that they result from the loss of elasticity of the skin of the eyelids.

Yellowish and brownish flat multiple tumors are found in older individuals, whose forehead and face, as a general rule, are covered by these small tumefactions. These are examples of so-called seborrheic wart. Darker and somewhat harder nodules, the so-called senile keratoses, occur also and may be precursors of cancer of the eyelid.

Soft, yellow, oval, single or multiple tumefactions, the result of fat-cell deposits, are called xanthoma palpebrarum and are easily differentiated from cancer of the eyelid by the distinctive yellow color and the absence of the pathognomonic hardness of cancer.

Umbilicated, multiple, smaller or larger tumefactions of molluscum contagiosum may at times cause confusion. The rapidity of the growth and the spread, the presence of inflammation about the older lesions, the otherwise unaltered character of the adjoining skin surface, the absence of hardness, and the presence of itching will serve as differentiations.

Such tumefactions as that produced by chalazion or other chronic nodular localized inflammatory conditions will need thoughtful consideration from the standpoint of differential diagnosis. The most important one of these occurs as a small nodule at the margin of the eyelid and persists for a long period, remaining unaltered in size and unassociated with pain or tenderness. The firmness of the surrounding connective-tissue bands within which it is located endows the lesion with that nonelastic hardness which resembles the stony hardness of eyelid cancer. The microscopic picture presented by this type of tumefaction has been interpreted as a form of tuberculous reaction. We have encountered this lesion a good many times. Repeated guinea-pig inoculations, however, failed to prove it as caused by the tubercle bacillus. Thus, as the result of this negative bacteriologic finding, we have come to consider this eyelid tumefaction as an example of a foreign-body reaction, perhaps due to the inclusion of a broken hair shaft or some such substance within this area. We have no proof of this contention, but no other explanation seems as rational. We have found that this particular type of nodule can be

differentiated only by microscopic investigation.

MICROSCOPIC CLASSIFICATION

Whenever and wherever it is possible all of the tumefactions about eyelids should be studied with the microscope.

Classification of eyelid cancer according to microscopic appearance falls into four groups: (1) the basal-cell or hair-matrix type, (2) the squamous-cell or epidermoid type, (3) the mixed-cell type, and (4) the melanoma group. The importance of knowing the type of eyelid cancer under consideration is not only of academic value but has important connotations from the standpoint of prognosis. Parenthetically speaking, a completely removed basal or hair-matrix type of cancer should result in no further annoyance to the patient. Chances of recurrence should be practically nil. On the other hand, one may not be nearly so optimistic when one of the other three types of eyelid cancer has been discovered, for in spite of the greatest care and most meticulous elimination of these new growths, recurrences are not only possible but, in instances, even likely. This, of course, is especially true of the last group mentioned, the so-called malignant melanotic tumors.

Of the 125 eyelid cancers, 60 were classified according to their microscopic appearance. Of these, on the upper eyelid, 2 were basal celled and 4 were of the epidermoid-cell variety. On the lower eyelid, 16 were basal celled, 7 were epidermoid celled, 1 was mixed celled, and 1 was a melanoma. At the inner canthus 24 were basal celled and 2 were of the epidermoid-cell variety. At the outer canthus 3 were of the basal-cell type of carcinoma. Thus, of the 60 so analyzed, 45 were found to be of the basal-cell type, 13 were of the epidermoid-cell type, 1 was

of a mixed-cell type of carcinoma, and 1 was a melanoma.

It is indeed fortunate that the preponderance of eyelid cancers proved to be of the basal-cell or hair-matrix-cell variety. The proportion was 3 to 1. It is fortunate because this type of carcinoma is usually but locally malignant and lends itself readily to complete removal. This is especially true if it is treated early. Recurrences are due either to faulty removal or to the fact that the tumors have so invaded the surrounding structures that no therapy can accomplish the desired effect.

STATISTICAL CONSIDERATION

Of the 125 patients under consideration, 79 were men and 46 were women. Their ages ranged from 25 to 80 years. The seventh decade of life furnished 47 of the 125 patients, while 82 were found to be in the age group from 55 to 74, showing that the preponderance of the cases occurred in the aged patients.

The duration of these tumors was difficult to ascertain for several reasons: (1) Because patients, as a general rule, are forgetful, (2) because they are unobserving, (3) because these tumors were so inconsequential at times that they did not merit the fixation of the time of their first observation, and (4) because of the so frequently inherent optimism of patients, which tends to permit anatomic abnormalities to go unnoticed. However, we did find that 41 patients reported the duration of the lesion to be from one to two years, thus placing one third of these tumors in that particular duration bracket, which seems reasonable and worthy of acceptance.

One other observation is of importance. This concerns itself with multiplicity of lesions. While numerous cancers of the skin of the same individual

are not an infrequent finding, cancer affecting the eyelid was a single entity in all instances. We attach a good deal of importance to this fact.

TREATMENT

The object of treatment, of course, is the complete eradication of the cancer present. This is to be accomplished with as little interference with function and with as little damage to the surrounding structures as possible.

SURGICAL TREATMENT. Whenever and wherever it is possible, cancer of the eyelids should be excised. This permits thorough microscopic examination, and invaluable information is gained as to the type of tumor and completeness of removal, both of which have, of course, a most important bearing on prognosis.

Excision is not possible if the tumor has invaded the surrounding structures to such an extent that the tumor cannot be freed and resected. Further difficulty with excision arises in the repair of the damage caused. Repair must be of such nature that the eyeball is not exposed unduly and that the eyelids are so reconstructed that their function is effectively maintained. When the entire thickness of the eyelid is involved in the neoplastic process, repair becomes difficult, but when the cancer is more superficial and freely movable, little difficulty is experienced because the loose and somewhat lax skin covering of the eyelids is easily shifted to cover the skin defects.

In carrying out surgical repair one must bear in mind at all times the following considerations: (1) that careful repair of the palpebral conjunctiva when it has been damaged is imperative; (2) that the proper support of the eyelids depends on properly reconstructed tarsal plates; (3) that eyelid-margin distortions

which could cause the inversion of the cilia are to be carefully avoided; and (4) that undue scarring is followed by retractions and the formation of an ectropion, and that this is also to be carefully avoided.

Repair of lesions excised from the region of the inner and the outer canthus offers fewer difficulties. This is due to the fact that although direct closures in many instances cannot be resorted to, pedicle grafts cut from adjoining skin surfaces are easily accomplished. These grafts can be obtained from the region of the glabella or the temporal area, depending on whether the damage is being repaired at the inner or the outer canthus, respectively. Our procedure in carrying this out is as follows:

An appropriately sized portion of skin is cut out, leaving a reasonably sized pedicle attaching it to the adjoining skin. The graft is transferred to the site of the excised area by a half twist of the pedicle. It is sutured into position by fine twisted silk and interrupted sutures and then bandaged in such a manner that pressure over the graft is maintained by means of a roller bandage of proper size. A wide elastic bandage is then wrapped about the head to insure the relative immobility of the dressing. One must be careful not to permit direct pressure to be applied to the eyeball; nor should the cilia be inverted during this procedure. A dressing of this type is kept in position for a period of five or six days, thus giving the graft an opportunity to adhere to the surfaces which have been uncovered by the operation.

Failures of takes from such pedicle grafts occur rarely, but when they do a variety of causes may be operative: These are as follows: (1) The pedicle is too narrow; (2) bleeding areas are not properly controlled, thus permitting an ac-

cumulation of hemorrhage under the graft which interferes with its adhesion; (3) the pressure applied is inadequate; (4) the dressing is removed before the fifth or sixth day. This last is exceedingly important. Sutures may be removed at the time of the first dressing, but the pedicle is permitted to remain for a period of at least three weeks. It is then easily removed and the final minor repair of the attachment is carried out.

Thirty-five of the 125 tumors were treated in this manner. Of these, 4 were of the upper eyelid, with 3 good results and 1 bad result; 16 were of the lower eyelid, with 13 good results and 3 bad results; 13 were of the inner canthus, with 12 good results and 1 bad result; 2 were of the outer canthus, both with good results. Thus, of the 35 surgical-scalpel excisions, 30 yielded good results and 5 bad results. Of the 5 bad results, 1, of the lower eyelid, was incompletely resected; 1, of the lower eyelid, yielded a malignant melanoma which terminated fatally; in 1, of the lower eyelid, the result could not be ascertained, for the patient failed to return; and 2, 1 of the upper eyelid and 1 of the lower eyelid, did not permit evaluation on account of the lack of sufficient time since operation.

Radio-knife excision followed by repair with pedicle grafting was carried out in 12 instances. It was a valuable method because it caused less hemorrhage and less shock and because it could be done quickly. Of the 12 patients thus treated, 2 had cancer of the upper eyelid, and both obtained good results. Six had cancer of the lower eyelids; we obtained good results in 4 and bad results in 2. Four patients had cancer of the inner canthus, in 3 of whom we obtained good results and in 1 a bad result. Thus, of these 12 patients, in 9 instances the results were good while in 3 instances they

were unsatisfactory. As the cancers treated by this method were extensive in size and considered not suitable for excision with scalpel, the high percentage of bad results is at least partially explained.

In another group of cases, in which the growth occurred at the inner canthus, excision with either scalpel or radio-knife surgery was not possible. In this group we found the cancer of the canthus to be of infiltrative character, and the tumors were firmly fixed to the fibrous structures of the surrounding area. The lesions themselves were immovable and firm. These patients were treated with *electrodesiccation*, unipolar diathermy being used for this purpose. After the tissues were thoroughly charred they were removed with a curette and the desiccated area painted with mercurochrome or, more recently, powdered with sulfathiazole and permitted to heal by granulation. Even after extensive electrodesiccation the scars obtained were highly satisfactory.

Such electrodesiccation was carried out in 13 cases. In the 1 instance of the upper eyelid a satisfactory result was obtained; of the 3 instances of the lower eyelid, only 2 satisfactory results were obtained; while of 8 instances at the inner canthus 4 satisfactory results were obtained; and in 1 instance of the outer canthus the result was unsatisfactory. Thus, of the 13 cases, 7 yielded good results while 6 yielded bad results. In the consideration of the high percentage of bad results, one must take into account the fact that only the inoperable type of cancer was subjected to this form of therapeutic approach.

In three instances the eyelid carcinoma was so extensive and so invasive that, in addition to electrocoagulation, enucleation of the eyeball was found imperative. One of these cancers occurred on the

lower eyelid, one at the inner canthus, and one at the outer canthus. None of these patients was helped by this treatment, and their disease resulted fatally.

NONSURGICAL TREATMENT. There were a number of reasons which prompted the use of methods other than surgical. These included the following: (1) The cancer was considered inoperable on account of its extension and size; (2) the patient was considered a poor operative risk; (3) the patient refused operation. In these instances X-ray irradiation was used in some form or other.

At first we used superficial unfiltered X ray, using lead foil as a shield both for the unaffected skin surfaces and over the eyeball itself. We experimented with a variety of doses from 350 r to 3,500 r in single or multiple treatments. After considerable trials we evolved a procedure which we use now and which we consider valuable. This procedure comprises the following steps:

An eye shield consisting of a soft lead-alloy material* is used for eyeball protection. It has an inner smooth concave surface to fit the contour of the eyeball and an outer convex surface to which a small projection is attached for the purpose of handling it. This eye shield is sterilized by allowing it to remain in 70-percent alcohol for 10 minutes and then placing it in sterile water for 5 minutes to remove all traces of alcohol. Sterilized mineral oil is then dropped upon the concave surface to act as a lubricant. The shield is held by the tiny grasping projection and is inserted between the eyelids: one edge is gently but firmly placed under the upper lid; then by pulling down on the skin of the lower lid, the other edge is permitted to slip under the lower lid. Various sizes of these shields

are required on account of the variability of palpebral apertures. Patients seem to tolerate this shield much better than they do the lead foil which we used before we became acquainted with this later type of protection. After the shield is placed in position the unaffected skin is covered with lead foil or leaded rubber and the treatment with the X ray is begun.

Recently we have utilized the so-called contact X ray instead of the ordinary superficial modality. We have obtained this energy from a Chaoul type of tube which has a focal roentgen-ray skin distance of 3 to 5 cm., depending on the length of the applicator used. The Chaoul tube is so constructed that the cathode is located at the tip of a cylindrical projection over which the applicators are placed. Between the target and the lesion there is a thin filter, consisting of 0.5 mm. of nickel window, which is needed to confine the water that circulates about the cathode as a cooling agent. A variety of applicators is available. This type of irradiation provides intensive local reactions, but the depth of the reaction is relatively short. It is this factor that makes it ideal for use in eyelid carcinoma. Because the skin and areolar structures of eyelids are thin, the opposition to the passage of superficial X rays of the ordinary variety is ineffective, and the deeper structures may be damaged unnecessarily.

Daily treatments of 500 r each were given. These treatments ran from 10 to 20 in number, depending on the severity of the reaction produced. Usually after the sixth treatment a softening of the tumor and a beginning inflammatory reaction were noted. Following this there was a gradual flattening of the lesion, and over the tumor site a superficial yellowish moist ulceration developed which was surrounded by a reddened and swollen sharply demarcated inflammatory zone. When this occurred, usually between the

* Supplied by V. Mueller & Co., Chicago, Illinois.

tenth and twentieth exposure, treatment was stopped. The reaction lasted from four to six weeks, then it subsided. Occasionally a course of treatments had to be repeated.

If the contact Chaoul tube for irradiation is not available, superficial X ray may be used. We have given 350 r with superficial X ray to carefully shielded areas in daily treatments until the development of a severe enough inflammation to conform somewhat to the type produced by the contact tube. Usually this requires about 10 consecutive daily treatments. As previously stated, both the depth and the width of the destructive reaction is greater with the ordinary superficial type of X-ray therapy.

Thirty-eight patients were treated with X ray. Of these, 17 were treated with the Chaoul contact modality. Of the 21 tumors treated with the ordinary superficial X ray, 6 were of the upper eyelid, 4 with good results and 2 with bad results; 6 were of the lower eyelid, 2 with good results and 4 with bad results; 7 were at the inner canthus, all with good results; 2 were at the outer canthus, 1 with good result and 1 with bad result. Thus, of the 21 patients so treated, in 14 instances good results and in 7 instances bad results were obtained.

Of the 17 tumors treated with the Chaoul contact type of X ray, 1 was of the upper eyelid, with a bad result; 5 were of the lower eyelid, all with good results; 8 were at the inner canthus, 6 with good results, 2 with bad results; 3 were at the outer canthus, 1 with good

results and 2 with bad results. Thus, of the 17 patients treated with the contact X ray, in 12 we obtained good results and in 5 bad results.

We treated but one patient with radium. His lesion was at the inner canthus. The result was unsatisfactory.

There were instances in which we had to use several methods of treatment—excision, electrodesiccation, roentgen ray, and radium. Various combinations of these procedures were used. In all, 23 tumors were so treated. Of these, 3 were of the upper eyelid, with 2 good results and 1 bad result; 10 were of the lower eyelid, with 7 good results and 3 bad results; 10 were at the inner canthus, 8 with good results and 2 with bad results. Thus, of the 23 patients treated with a combination method, we obtained good results in 17 and bad results in 6 cases.

Recapitulation shows that of the 125 patients, good results were obtained in 97 patients, unsatisfactory results in 28, for one reason or another. We further learned that no method yielded more satisfactory results than others and that the method of therapeutic approach depended on extent, operability, or the willingness of the patient to undergo certain procedures.

However, the general impression we gained was that the most satisfactory results were obtained from scalpel excisions or contact X ray, using the special shield which was described.

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RECESSION OF THE INFERIOR-OBLIQUE MUSCLE FROM THE EXTERNAL-RECTUS APPROACH*

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Overaction of the inferior-oblique muscle as a result of a paralysis of the homolateral superior-oblique muscle, or of the contralateral superior-rectus muscle, is not a common condition. Nevertheless, it may cause a hypertropia or ocular torticollis. When it causes these conditions and does not respond to treatment with prisms,¹ then surgical correction is necessary.[†]

This operation has been discussed by White,^{1,2} who believes that it is indicated for the following purposes: 1. To correct a secondary deviation (of the inferior oblique) caused by a paresis of the superior rectus of the fellow eye. 2. To correct the secondary contraction due to paralysis of the superior-oblique muscle of the same eye.

At the suggestion of Dr. Frederick A. Davis of Madison, Wisconsin, that a procedure for a recession of the inferior-oblique muscle be studied and systematized, the author for the last five years has compared the results secured by myectomy and tenotomy with the results obtained by recession of the overacting inferior oblique. The results of this study will be presented in a later paper. The technique and procedure, however, of the recession of the inferior oblique will be presented here.

The procedure for the recession of the inferior-oblique muscle from the external-rectus approach after being worked

out on the cadaver was then performed successfully on patients. The result obtained was a satisfactory reduction of the overacting of this muscle followed by reduction of the hypertropia and in most instances by decrease of torticollis.

Recession of the inferior oblique can be performed under either local or general anesthesia.

PROCEDURE

Step 1, Incision. An 8-mm. vertical incision, 3 mm. from the external canthus, is made through the conjunctiva, but not through Tenon's capsule (drawing A). The longitudinal fibers of the external-rectus muscle can be seen through the vertically appearing tissue of Tenon's capsule over the muscle (drawing B).

Step 2. The incision is extended through the three layers of Tenon's capsule down to the external-rectus muscle. This muscle is dissected from the lateral bands of Tenon's capsule so that the strabismus hook can be inserted below it (drawing C).

Step 3. A suture is placed through its insertion as close to the sclera as is possible (drawing D).

Step 4. The external rectus is gently freed from the globe by nicking the central fibers of its insertion in the tissue between the sutures and the sclera, and by spreading the blades of the scissors. This method prevents cutting the sutures in the insertion and conserves the tissue. The external-rectus muscle when freed is gently pulled laterally and away from the globe (drawing E).

Step 5. While the bulb is rotated nasal-

*From the Department of Ophthalmology, Children's Memorial Hospital. Presented before the Indianapolis Academy of Eye, Ear, Nose, and Throat, April 22, 1943.

†The nonsurgical treatment of the less severe of these insufficiencies will be presented in a later paper.

ly by fixation forceps grasping the stump of the insertion of the external rectus, a squint hook with its rounded point downward is gently inserted below the globe until its curved edge touches the floor of the orbit. This tissue which becomes engaged upon the forceps contains the inferior-oblique muscle imbedded in the fibrous connections joining it with the external rectus (drawings F and G).

Step 6. The inferior-oblique muscle is now freed from the inferior-rectus muscle as the former is gently pulled upon to expose it to view. This procedure depresses the posterior pole of the globe and elevates the anterior pole if the globe is held in adduction by the surgeon (drawing H). The fibrous connections between the external-rectus muscle and the inferior-oblique muscle are definite, thick bands (drawing H), as are similar connections between the inferior-oblique muscle and the inferior-rectus muscle (drawing I). These bands between the three muscles must be dissected free if a recession of the inferior-oblique muscle is to be done. (They should not be freed if a myectomy or tenotomy alone is contemplated or else a complete lack of function will result.) Meanwhile, a test is made to separate the action of the inferior-oblique muscle from that of the inferior-rectus muscle, as follows:

The rounded edge of a second squint hook is placed in the lower conjunctival sac to push the globe down and in as the pull on the hook below the inferior oblique is decreased (drawing G). Gradually the pressure on the hook in the lower cul-de-sac is released as the pull on the hook below the inferior oblique is gently increased. If the inferior oblique is on the hook isolated from the inferior rectus, the anterior pole of the eye will travel upward (drawing H). As the hook in the cul-de-sac is removed completely the gen-

tle traction on the hook below the inferior oblique is increased, and the anterior pole will travel upward to a fixed position. This test for the presence of the inferior oblique when positive will tell the surgeon that the inferior-rectus muscle is not on the hook and therefore prevent the surgeon from cutting the inferior-rectus muscle, which could easily be done were both engaged upon the strabismus hook. When this test discloses that only the oblique muscle is on the hook and after this muscle is freed from the fibrous bands seen in drawings G, H, and I, it is engaged between the blades of an advancement forceps in order to immobilize it (drawing J).

Sutures similar to those used in the Reese resection operation are inserted in the muscle central to the forceps, to prevent the retraction of its central freed end before it is sutured to the globe (drawing K). Similar sutures are placed in the peripheral end of the inferior-oblique muscle, the recession forceps are removed, and the cut ends are sutured to the globe. A space of 3 mm. between the two rows of sutures should be allowed (drawing K). No muscle tissue is removed. Following this tying of the sutures the globe is depressed downward for a few moments so that the tissue may as much as possible resume its preoperative relationship.

The external rectus, if it is not to be operated upon further, is reattached to its insertion by interrupted catgut sutures (drawing L). If a resection or an advancement of this muscle is contemplated, it can be done now. The conjunctiva is then closed by interrupted sutures (drawing M).

The advantages of recession of the inferior-oblique muscle from the external-rectus approach are:

1. A second (skin) incision is unneces-

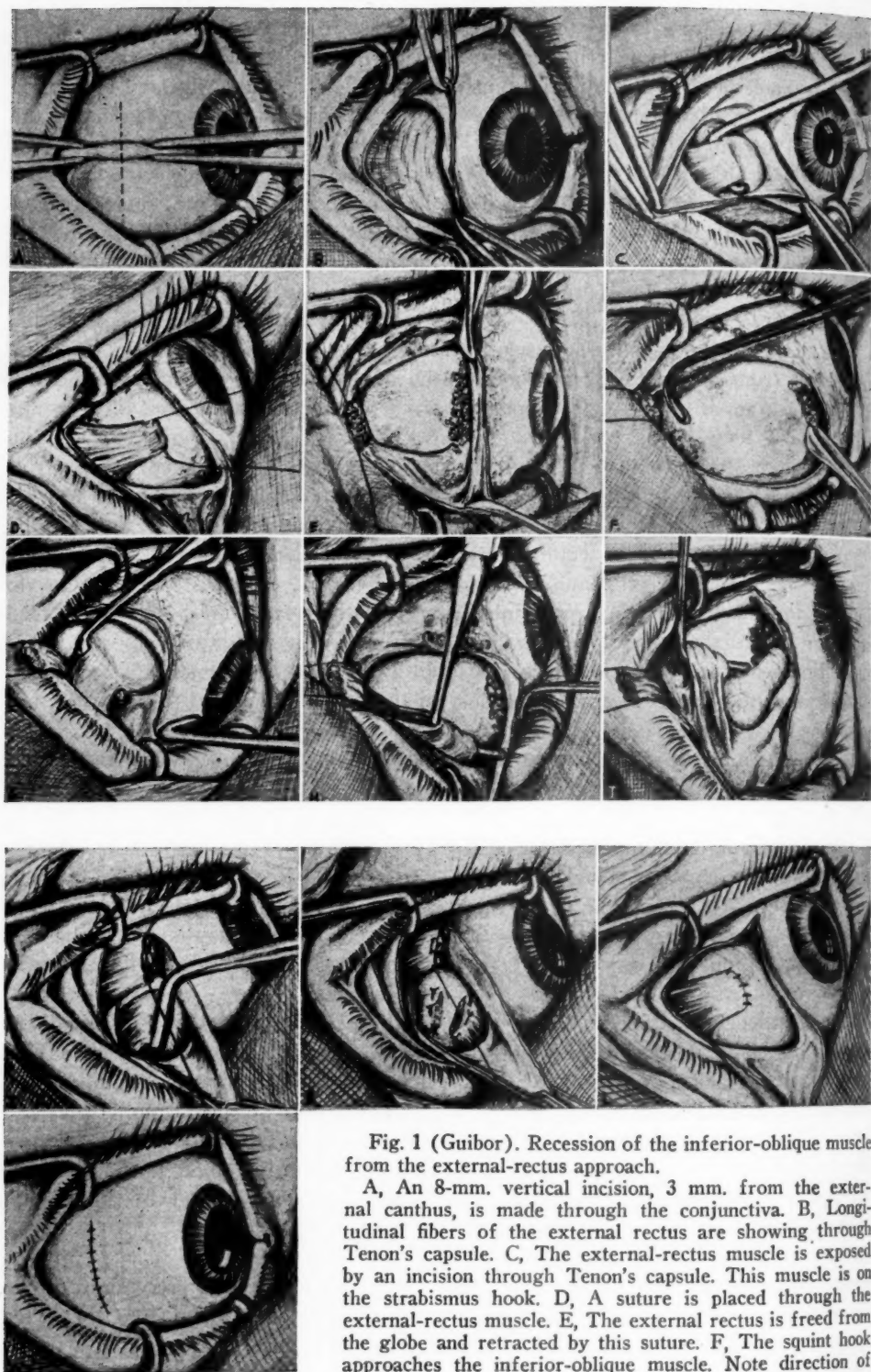


Fig. 1 (Guibor). Recession of the inferior-oblique muscle from the external-rectus approach.

A, An 8-mm. vertical incision, 3 mm. from the external canthus, is made through the conjunctiva. B, Longitudinal fibers of the external rectus are showing through Tenon's capsule. C, The external-rectus muscle is exposed by an incision through Tenon's capsule. This muscle is on the strabismus hook. D, A suture is placed through the external-rectus muscle. E, The external rectus is freed from the globe and retracted by this suture. F, The squint hook approaches the inferior-oblique muscle. Note direction of

sary because in most cases of squint the external rectus is operated upon anyway.

2. The field of operation is more accessible than in the other approaches to the inferior oblique.

3. There is little possibility of tenotomizing the inferior rectus if the test for the inferior-oblique action is made as described.

4. The results can be accurately foretold in most cases, and a recurrence of the overaction of the inferior oblique is unlikely to ensue.

5. Postoperative paralysis of the inferior oblique is less likely to occur than when a myectomy of this muscle is done.

SUMMARY

A procedure for recession of the inferior-oblique muscle from the external-rectus approach is suggested. Drawings

made from photographs of the operation are presented. These illustrate:

1. Incision through the conjunctiva.
2. Exposure of the external rectus.
3. Insertion of sutures in the external rectus.
4. Freeing and retraction of the external rectus.
5. Isolating the inferior oblique on the hook and identification of the muscle.
6. Freeing of the inferior-oblique muscle from the lateral-rectus and inferior-rectus muscles.
7. Grasping the inferior-oblique muscle with the recession forceps midway between the origin and insertion.
8. Insertion of the sutures in the inferior-oblique muscle, its section, and its reattachment to the globe.
9. Reattachment of the external-rectus muscle to the bulb.
10. Closure of the conjunctival incision.

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REFERENCES

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hook, G, The tissue which is engaged upon the hook contains the inferior-oblique muscle imbedded in the fibrous connections joining it with the external-rectus and the inferior-rectus muscles. Note that the inferior oblique is not dissected from this tissue as yet. H, The fibrous connections between the external-rectus and the inferior-oblique muscles should be dissected free. Note fibrous bands between these two muscles. I, The fibrous bands between the inferior rectus and the inferior oblique are on the strabismus hook. These should be dissected free. J, After the inferior-oblique muscle is freed from its connections forceps are applied. K, The inferior-oblique muscle is bisected and the two free ends are reattached to the globe. L, The external rectus is reattached to the globe. M, The conjunctiva is closed by interrupted sutures.

TRANSSCLERAL LACRIMAL-CANALICULUS TRANSPLANTS*

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The fact that glaucoma is one of the common causes of blindness and one of the most difficult therapeutic problems encountered by ophthalmologists justifies further research in an attempt to control this destructive disease. In view of the limitations of present-day management of that group of clinical entities which we classify as glaucoma, we are looking forward to the day when an adequate medical regime will entirely replace the surgical treatment of glaucoma. Medical treatment has many obvious advantages over surgical treatment. It seems more rational, and is the type of treatment in which the prospects for successful future advances seem more likely. Until that day when the satisfactory medical treatment has been established, it is still necessary to rely on the surgical approach to this problem in both the clinical and the research fields.

Of the more satisfactory types of operative procedures for the control of ocular hypertension have been those operations which, in order to establish aqueous filtration, utilize uveal epithelium to form a permanent channel through the sclera from the anterior chamber to the subconjunctival tissues. While these types of operations are performed merely to secure symptomatic relief, it has been demonstrated that they are fairly effective in preserving vision in many eyes when performed at a sufficiently early date. In view of the technical disadvantages of all these accepted operations, it is with considerable hesitancy that an even more

complicated and technically difficult procedure is proposed, such as transscleral canaliculus transplants. However, this seemed an interesting field for surgical research, and consequently the following investigation was carried out.

THE PROBLEMS

It is the purpose of this thesis to report a series of experiments which were performed with the immediate objective of investigating the various early steps in the establishment of an epithelial tube through the sclera with the ultimate hope of finding a type of filtration operation that might be an addition to our operative armamentarium in the control of glaucoma. Since an epithelial tract of iris tissue functions satisfactorily in some instances and fails in others, another source of epithelial tissue was sought which would have anatomic and physiologic advantages over the uveal tissue. The tubelike structure of the lacrimal canaliculus seemed to satisfy this requirement. If it could be satisfactorily grafted into the sclera, it might be utilized as a source of epithelial tubing for the establishment of a drainage canal from the anterior chamber through the sclera to the subconjunctival spaces. The six main problems which presented themselves were: (1) Could the canaliculus be satisfactorily dissected from the lids and freed of connective tissue? (2) Could it be placed into the sclera satisfactorily? (3) Could it be maintained in position? (4) If it were maintained there, would it be grafted and remain viable or would it become necrotic? (5) Would the eye tolerate this transplant? (6) If so, would it filter aqueous in the proper amount?

*From the Department of Ophthalmology, Temple University Medical School. Candidate's thesis for membership accepted by the committee on Theses, American Ophthalmological Society, 1942.

PROCEDURE

Problem 1 was solved relatively easily. In the spring of 1938 one eye of each of seven dogs was operated on. Under ether anesthesia the lacrimal punctum of dog 1A was dilated and a lacrimal probe was inserted. A circular incision was made through the conjunctiva around the punctum, about 1 mm. from the probe. Dissection was carried down into the tissue about 3 to 4 mm. on all sides of the probe. When this depth had been reached, the probe was withdrawn slightly and the canaliculus was cut transversely, leaving a collar of canaliculus about 3 mm. long around the probe. The specimen was trimmed of connective tissue, and a satisfactory segment of the lacrimal canaliculus was obtained for transplantation.

Problem 2 was the placing of the graft into the sclera. A keratome incision was made through the sclera into the anterior chamber, but it was found technically impossible to place the graft into the sclera, and the first eye was lost. This difficulty, however, suggested the necessity of inserting an obturator into the lumen of the canaliculus. Consequently, segments of metal lacrimal stylets, about 3 mm. long, were fashioned, and at the second operation the canaliculus was placed around the stylets quite satisfactorily. When the stylet containing the canaliculus was introduced into the keratome incision, the cornea was so displaced in dog 2A that it became obvious that some type of procedure that would remove part of the sclera was necessary to accommodate the graft. Since a keratome incision had been made, the eye of dog 2A was lost for further research. In the third experiment, which was performed on dog 3A, the canaliculus was prepared as previously described. A keratome incision was made in the sclera, about 2 mm. from the limbus. Then, with a

Berens scleral punch, a 1-mm. segment was taken from the anterior lip of the scleral incision. The graft with the metal obturator was inserted, and it fitted well into the scleral opening. The conjunctiva was closed over the metal obturator and the graft. Two days later the obturator had slipped out of position and the eye was lost. The fourth experiment, which was performed on dog 4A, was similar to the foregoing experiment, except that an L-shaped stylet was used in an attempt to keep the graft from slipping. This seemed to work somewhat better, but a severe incarceration of the iris occurred, which suggested the necessity of combining an iridectomy with the transplantation in order to prevent the development of an iris synechia. In the fifth experiment, on dog 5A, an angled stylet was introduced through the Berens punch wound after an iridectomy had been performed. On the third postoperative day the wound became infected and the transplant sloughed out. The same result was met with in the next two operations on dogs 6A and 7A. All the operations in series A were failures, and the conclusion was drawn that the stylet was too great a foreign body and proved an unsatisfactory obturator. None of the material from these experiments was adequate for microscopic study. The second step—namely, that of placing the transplant into the sclera—was not feasible, and the work was discontinued for two-and-one-half years, as the opportunity for further research was not available until the fall of 1941, at which time a second series of operations was performed. The animals in this series were termed B.

In September, 1941, this B series of operations was begun. Ten operations on nine eyes of six dogs were performed. It was recognized that a method to create intracanalicular pressure all along

the canaliculus when it was placed in the sclera was necessary. This problem was similar to that in skin grafting, in which one of the paramount requisites is uniform pressure over the graft; it differed from skin grafting, however, in that the pressure had to be applied to the 360 de-

accommodate the canaliculus graft. The canaliculus was then removed from the salt solution. A long no. 0 catgut suture was threaded through the canaliculus, and then turned around and passed back and forth through the canaliculus seven times until it was no longer possible to



↑
CILARY PROCESS

Fig. 1 (Gibson). Dog 3, series B (left eye). Metal obturator. One week postoperative. Section shows canaliculus close to internal

←
ANTERIOR CHAMBER

scleral surface, and the canaliculus epithelium is continuous with the epithelium of the anterior part of the ciliary processes.

grees of the internal circumference of the canaliculus. Since the metal obturator had apparently failed in the previous series of cases, the necessity for a softer and absorbable obturator was recognized, and catgut was selected as a possible material.

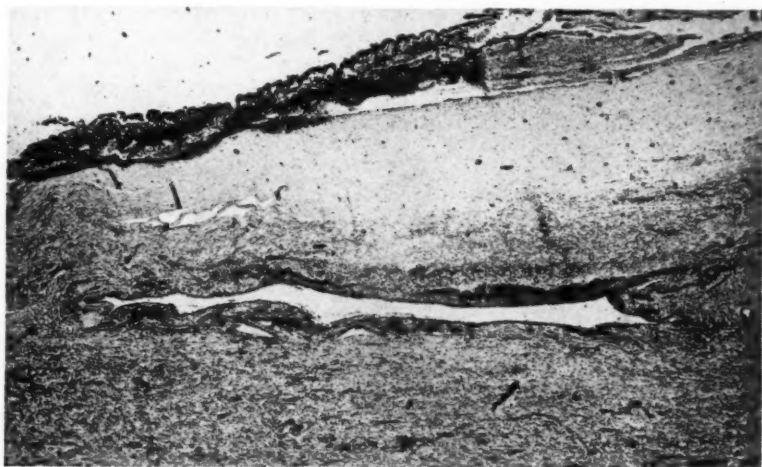
Accordingly, on September 15, 1941, dog 1 of series B was operated upon under intravenous veterinary nembutal, 4 c.c. being injected according to dosage for the body weight of the dog. The canaliculus was prepared according to the method described in Series A, and placed in physiologic salt solution. A large conjunctival flap was dissected, and a keratome incision was made 2 mm. from the limbus, and about 4 mm. long, passing into the anterior chamber. An iridectomy was performed. With a Berens scleral punch a 1-mm. button was removed from the anterior lip of the keratome incision to

pass further strands through the lumen. Close to each end of the canaliculus a loop of catgut was tied around the strands of catgut as they protruded from the lumen of the canaliculus, and both ends were securely tied. Next the strands which passed through the lumen were cut off close to the knots. Thus the implant consisted of a segment of canaliculus, about 3 mm. in length, through the lumen of which passed seven strands of catgut, which in turn were tightly tied at each end so that they formed a unified obturator. This implant was then inserted into the scleral opening made by the Berens punch. With a little manipulation it slipped snugly into the opening and seemed quite secure. The conjunctival flap was sutured back in place over the implant. The knot on the inner end of the implant could be seen in the anterior chamber, and the knot on the outer end

made a slight protrusion under the conjunctival flap. This solved problem 2; namely, whether the canaliculus could be satisfactorily placed in the sclera. On the third postoperative day the dog died an anesthetic death, never having regained consciousness. The eye was im-

exactly the same manner as was the right eye of dog 1B. The graft fitted snugly into the opening which had been prepared for it. The dog recovered from the anesthesia. Atropine was applied to the eye daily as it was in all subsequent experiments. One week later the eye was

Fig. 2 (Gibson). Dog 6, series B (right eye). Non-obturator technique. One week postoperative. Longitudinal section of canaliculus. The canaliculus is misdirected here, due to a technical error in operation.



mediately removed, placed in formalin, and sent to the pathology department for microscopic study.

The microscopic slides from this dog failed to show the operative field. Due to a technical error in the preparation of the sections no microscopic evidence of an operation having been performed was discernible. It is most probable that additional sections from this eye and others in which the operative field was not located would have been fruitful, but for technical reasons this was not done.

On September 22, 1941, dog 2 of series B was operated on in a similar manner, but before the operation was completed the dog died an anesthetic death. The operation was completed, but no study was made or conclusion drawn from this experiment, and there was no material for microscopic study.

On September 29, 1941, the right eye of dog 3 of series B was operated on in

exactly the same manner as was the right eye of dog 1B. The graft fitted snugly into the opening which had been prepared for it. The dog recovered from the anesthesia. Atropine was applied to the eye daily as it was in all subsequent experiments. One week later the eye was examined and was found to be in excellent clinical condition. There was only slight conjunctival reaction, restricted to the operative field, such as one sees after a trephining operation. The cornea appeared to be normal. Two weeks later the reaction had almost completely subsided, and the catgut was not visible in the anterior chamber. Five weeks after the transplant this dog was again anesthetized with 5 c.c. of intravenous nembutal, and the conjunctival flap was again elevated in order that the operative field might be explored. The area of the canaliculus was located, and it was found to be covered with a very thin membrane of tissue on the external surface of the sclera. Gentle stroking of the membrane with a spatula caused it to rupture, and the aqueous was lost although the sclera was not opened. This suggested that the aqueous was coming through the canaliculus but was being retarded by this thin

membrane. The membrane was so thin that it seems probable that if the aqueous had been under pressure as in glaucoma, it would easily have permeated the membrane. This solved problem 3, showing that the canaliculus could be maintained in position. The conjunctival flap was then resutured.

Ten days later the eye was exam-

ined, when the reaction was found to have subsided and the anterior chamber had formed. A hypodermic needle was introduced through the cornea into the anterior chamber, and sterile salt solution was forced in under pressure, through a syringe, to determine if the canal was patent, but no subconjunctival bulging over the area of the transplant could be demonstrated. One week later this eye was enucleated and sent to the laboratory for study. The pathologic material from this eye was properly located, and revealed the canaliculus with open lumen transplanted deep in the sclera.



Fig. 3 (Gibson). Dog 3, series B (right eye). Catgut technique. Eight weeks post-operative. This section shows canaliculus growing half way through sclera. The large open white area is not the anterior chamber, but a deep tear made in the sclera in preparation. The smaller opening is only part of the lumen cut obliquely. The lumen remains patent after eight weeks.

ined, when the reaction was found to have subsided and the anterior chamber had formed. A hypodermic needle was introduced through the cornea into the anterior chamber, and sterile salt solution was forced in under pressure, through a syringe, to determine if the canal was patent, but no subconjunctival bulging over the area of the transplant could be demonstrated. One week later this eye was enucleated and sent to the laboratory for study. The pathologic material from this eye was properly located, and revealed the canaliculus with open lumen transplanted deep in the sclera.

On October 6, 1941, the left eye of dog 4 of series B was operated on in a similar manner. Eight strands of no. 0 catgut were drawn through the lumen of the canaliculus and placed in the sclera, as previously described. Ten days later the eye was in excellent clinical condition,

and the catgut was not visible in the anterior chamber. Three weeks after operation the eye was enucleated for microscopic study. Due to a technical error in the preparation of the sections, the field of operation was not visible in the microscopic specimens.

On October 13, 1941, the left eye of dog 5 of series B was operated on. The canaliculus was excised, a conjunctival flap was made, and a keratome incision was made 2 mm. behind the limbus. An iridectomy was done, and a scleral punch with the Berens instrument was made. Eight or nine strands of catgut were threaded through the canaliculus, and the transplant was inserted into the punch wound. It snapped firmly into position, and the inner knot was visible in the anterior chamber; the conjunctiva was closed with a single suture. Examination two weeks later revealed that the knot had absorbed from the anterior chamber; the eye was soft, and a large pool of subconjunctival aqueous was present. One week later, or three weeks after this operation, sterile salt solution was forced under pressure into the anterior chamber, but no evidence of fluid exchange from the anterior chamber to the subconjunctival space was demonstrated.

On December 1, 1941, in the absence of other experimental material, and since this same eye looked as good as though it had not been operated upon, it was decided to do a second canalizing operation of a different type on this same eye. A subconjunctival flap was dissected temporal to the area of the first operation. A keratome incision was made, and a second iridectomy was done. At this time

sclera down through the depth of the wound. Pressure was to be obtained by the tightly drawn sutures, thus firmly opposing the two margins of the wound. The conjunctiva was closed. Two weeks later, after the two operations, the eye was in excellent clinical condition and was enucleated for study.

The microscopic sections revealed the transplanted canaliculus. In one area the

Fig. 4 (Gibson). Dog 4, series B (right eye). Non-obturator technique. Two weeks postoperative. Canaliculus growing in center of sclera. The lumen is partly open and partly collapsed. This experiment shows that the transplant can be placed without an obturator, but the lumen remains open better in the catgut technique.



it was our impression that the previous technique had not been satisfactory, and another type of operation was performed. No catgut or metal obturator was employed and no Berens punch procedure was used. The canaliculus was sutured into the incision in the sclera. Two silk sutures were placed in the corneal margin of the incision and then passed through the side of the canaliculus without perforating the lumen; the sutures were then passed through the posterior part of the keratome incision, and the canaliculus, without an obturator, was inserted in the keratome incision. It fit snugly in place. The sutures were tied, and the canaliculus was in a very satisfactory position. It was hoped that the raw external surfaces of the canaliculus would graft to the surface of the incised

lumen was cut so as to show that it still contained degenerating catgut. The epithelial cells were partly necrotic in certain sections, and the graft, although present, did not appear to be so successful as it was in some of the others. In some sections a partial section of the epithelium could be seen growing quite normally. The area where the nonobturator technique was used was not positively located in the microscopic section.

On November 17, 1941, the left eye of dog 3 of series B was operated on. The flap, the incision, the iridectomy, and the Berens punch opening were all made in the routine manner. However, a metal (brass alloy) obturator, consisting of 3 mm. of a lacrimal stylet, was used. This stylet was fashioned so as to have two flanges on one end; these protruded lat-

erally about 1 mm. on each side, so that the obturator could not slip into the anterior chamber. The stylet was placed in the lumen of the canaliculus. It fitted snugly into the punch opening with the canaliculus. The conjunctiva was closed. Examination one week later revealed that

showed the opening of the canaliculus within the eyeball. The epithelium of the canaliculus could be seen growing over the internal margins of the scleral wound, and the epithelium of the canaliculus appeared to be growing over to join the epithelium of the ciliary body. While

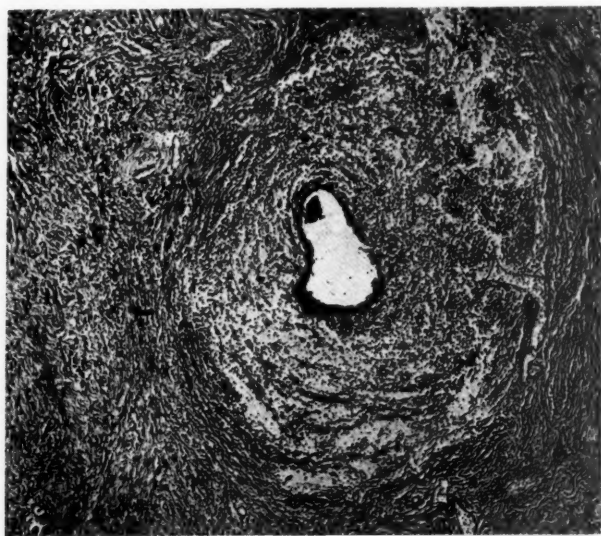


Fig. 5. (Gibson). Dog 5, series B (right eye). Catgut technique. Three weeks postoperative. Section shows fair growth of epithelium with some necrosis. Around the canaliculus there is a zone of tissue composed of new granulation tissue, new round cells, edema, some pericanalicular connective tissue, and some new and active blood vessels.

there was a severe reaction, that the cornea was very hazy in the upper third, and that the obturator had sloughed out of the place where it had been inserted and was almost ready to drop out of the eye. Salt solution injected into the anterior chamber did not come out under the conjunctiva, and one week after operation the eye was enucleated and sent for pathologic study.

The microscopic material from this eye consisted of 12 slides arranged in incomplete serial sections. The first five of these showed great thickening of the episcleral tissue due to young granulation-tissue proliferation combined with intense cellular infiltration and edema. The sixth slide showed the canaliculus grafted and viable in the sclera, with a somewhat mild cellular reaction around the canaliculus. In one section the transplanted epithelium

these sections do not reveal an undoubted opening, they do show that the epithelial graft takes all the way through the sclera, down to and continuous with the ciliary epithelium. Following along the sclera in the other sections, the healthy transplanted epithelial tubing can be followed all along the depth of the sclera to the surface. The epithelium averages about seven cells in thickness. The lumen is patent all along the tube; the surface of the epithelium is smooth, and the cells are viable. The basement membrane is intact, and adherent in its complete circumference in all the sections. This experiment answered problem 4, in that the graft would take and remain viable and not become necrotic. This and all the other eyes in this series B answered problem 5, that the dog's eyes would tolerate the operation.

On November 24, 1941, the right eye of dog 4 of series B was operated on. Two silk sutures were inserted in the anterior margin of the scleral incision, and passed one on either side of the resected canaliculus; then the sutures were put through the posterior margin of the scleral incision. The Berens punch was not used in this operation. The canaliculus was inserted into the scleral incision, so that one end extended into the anterior chamber and one end was left protruding under the conjunctiva. No metal nor catgut obturator was used in this experiment. There was very little reaction, and the eye was in excellent condition when, two weeks later, this eye was removed and sent for pathologic examination.

Examination of the serial sections from the right eye of dog 4B revealed that the area of operative interference was accurately located. In some of the sections it was possible to locate a portion of the transplanted canaliculus. The lumen was adequately open. The epithelium was intact, the cells were normal in appearance, and there were about 10 cells from lumen to basement membrane. The epithelium was neatly adherent to the sclera in its entire circumference and there was no evidence of operative activity in the sclera immediately adjacent to the canaliculus. There was slight infiltration of round cells, and there were quite a few more capillaries in the pericanalicular zone than are seen in normal sclera. Following the sections from the middle toward the external and internal surface of the sclera, it was found that the canaliculus became progressively smaller until, at either extremity, it appeared that the lumen of the canaliculus was almost obliterated.

About 2 or 3 mm. from the transplant there was a low-grade, well-circumscribed abscess that extended about half-way through the sclera. In its low-grade appearance this abscess resembled an early

tubercle. While it extended along the transplant, it did not involve the transplant. It appeared as if it would become absorbed. There were no clinical signs of inflammation.

Although this experiment was satisfactory from the standpoint of grafting, the canaliculus did not reach either surface of the sclera in the sections which we obtained.

On November 10, 1941, the right eye of dog 5 of series B was operated on. The steps of this operation were as follows: (1) The canaliculus was prepared. (2) A conjunctival flap was made. (3) A 3-mm. keratome incision was made and the Berens punch was used. (4) The opening in the conjunctival flap was sutured, as it was inadvertently button-holed. (5) Eleven strands of catgut were threaded through the canaliculus. (6) The Berens punch opening was twice enlarged, as the implant was larger than usual. (7) The implant fitted snugly in place, and the conjunctiva was closed.

Three weeks later the eye was in excellent condition, and it was enucleated and sent to the laboratory for microscopic study.

The microscopic report of the right eye of dog 5B revealed that the transplanted canaliculus was viable, with open lumen growing in the sclera. The lumen was completely open and contained a transudate and some fragments of catgut. The epithelial surface was relatively smooth, and appeared to be about five or six cells in depth. A few of the cells appeared to be sloughing off the surface. The basement membrane was in complete contact with the surrounding connective tissue from the lid, and this in turn was in close contact with the adjacent sclera in its entire circumference. There was excellent capillarity and evidence of circulation in the transplant all the way up to the epithelium. The scleral fibers coursing

around the transplant were normal except for the slight curving displacement caused by the transplant. In none of the sections was there any evidence of scar tissue due to the operation. The transplant gave the appearance of normal structure in its normal locus. Some of the sections showed areas where small fragments of the mucous membrane had sloughed away, and the cells appeared less viable than in some of the sections which were surrounded with less connective tissue. In this section neither of the ends of the canaliculus was located.

On December 8, 1941, the right eye of dog 6 of series B was operated on. The procedure in this case was the usual flap, iridectomy, and keratome incision. The incision was enlarged laterally with scissors, and an iridectomy was performed. The canaliculus was prepared and sutured in place in the sclera with two sutures, as previously described, but the position was not satisfactory. The wound was closed. Convalescence was uneventful, and one week later the eye was removed and sent to the laboratory for study.

The sections from this dog's eyes show an excellent "take" of the epithelial tube. The tube can be demonstrated to extend from one surface of the sclera to a point quite deep in the sclera. The section is cut so as to give a longitudinal section of the transplanted canaliculus. The lumen is well opened. In some of the sections the catgut sutures which were used in this case can be seen coursing into the margins of the canal. The epithelium, which is healthy in most places, can be followed for a considerable distance traversing the sclera. Due to difficulty in getting it properly inserted at the time of operation, the direction of the canal is not correct, but the graft is very successful and it can be seen to be growing into the surrounding sclera. Although the specimen is only one

week old, it is unquestionably growing quite solidly into the sclera along the entire course of the tube.

Summary of procedure. Seven eyes of seven dogs were operated on in series A. While the operations were all failures, invaluable lessons were learned and applied to advantage in series B.

In series B the operation was performed on nine eyes of six dogs. For various technical reasons four of these specimens were of no value. Of the remaining five eyes, which came to fairly satisfactory microscopic study, all showed evidence of success. In two the evidence of success was not marked. In three it seemed quite satisfactory. In none of the dogs' eyes was there clinical or microscopic evidence which suggested that an entirely patent channel had been established. However, our efforts in this regard were not so complete as they might have been.

DISCUSSION

The encouraging features of this experiment were: (1) The relative simplicity of the procedure. (2) The minimal clinical reaction and excellent postoperative appearance of all the eyes that had been operated on (exception: metal obturator case). (3) The success of the "take" of the graft. As the numerous microscopic slides were studied, one was constantly struck with the healthy appearance and completeness of the "take" of the epithelium. (4) The patency of the lumen. (5) The absence of untoward microscopic evidence of scleral reaction and scar formation.

The microscopic studies of the fate of the two ends of the canaliculus left something to be desired. This was partly due to the extreme difficulty of locating the ends of the tube in the microscopic studies. Problem 6—namely, Would the

canaliculus filter aqueous?—remained unanswered because we did not have chronic intraocular hypertension in the dogs' eyes and our attempts to force aqueous through the canal were somewhat incomplete.

OBJECTIONS

There are many objections to this procedure, some of which are obvious and probably many others to which attention must be called. The first of these is the technical difficulty inherent in the preparation and the fit and maintenance of the graft. Such technical difficulties have been fairly well overcome.

Clinical difficulties may present themselves, such as the presence of hypotony, ectasia, phthisis, and late infection, which must be considered as possible pitfalls, and which, if they do occur, may be disastrous or may be overcome by modifications of the technique. None of these, however, was encountered in the dogs' eyes.

There are biologic objections that may be encountered clinically and that have to do with the activity of the epithelial cells in the anterior chamber. Unsettled are the problems of their growth, necrosis, obstruction, or opening of the ends of the tube.

Optical objections also are to be considered, such as refractive errors, and the effects on the lens and iris.

One of the most important objections is bacteriologic. Although it was gratifying to see that none of the eyes showed clinical signs of infection, and only one eye exhibited microscopic evidence of infection, yet the series is too small to warrant great enthusiasm in this regard. The procedure used in the operating room was designed merely to prevent the introduction of new organisms into the eye. Hands were scrubbed carefully, and the instruments received the usual preopera-

tive care. The eyes were merely irrigated with boric acid, and they were carefully draped as in routine eye surgery. The canaliculi, which obviously were contaminated, were not subjected to anything stronger than physiologic salt solution. This was done in order to determine if intraocular implant infection was likely to occur, and in series B this did not occur. These experiments were all terminated short of the time required for late infection, although one eye was followed uneventfully for eight weeks before it was removed.

CLINICAL APPLICATION

All the well-known rules and limitations which are inherent in animal experimentation and their application to clinical cases unquestionably apply in these experiments. Due cognizance is taken of the probable undue enthusiasm following the partial success of these intrascleral-canalculus transplants in animals, and the improbability of ultimate clinical success in crossing the gap between animal experiment and clinical application.

SIGNIFICANCE

After consideration of the more obvious objections and limitations, after the clinical observations on the dogs' eyes, and after studying the many microscopic slides in this experiment, the conclusion was reached that the procedure was sufficiently promising to warrant a clinical trial. Accordingly, a patient with glaucoma who had little vision to lose was selected for clinical trial.

CASE REPORT

On May 15, 1939, F. D., aged 57 years, colored, came to the Temple University Hospital Eye Clinic for ocular treatment. He stated that one year previously he had had an operation on each eye performed elsewhere. His chief complaint was of

failing vision. There was no history of ocular pain. Examination revealed that his vision, with glasses, was 6/60 in each eye. The external appearance of the eyes was normal except for an iridectomy at the 12-o'clock position in each eye. The visual fields were concentrically contracted to less than 10 degrees. The ocular tension was 43 mm. Hg (Schiötz) in the right eye and 18 mm. in the left. The media were clear. Fundus examination revealed bilateral glaucomatous cupping of the disc. The diagnosis was advanced postoperative chronic simple glaucoma.

Since there was so little residual function of the optic nerve, further surgical treatment at that time was considered inadvisable. During the next two-and-one-half years various combinations and concentrations of pilocarpine, eserine, and epinephrine bitartrate were used. The tension, however, remained elevated all this time, regardless of which medication was used, and in spite of medical treatment there was a progressive loss of vision in each eye. In June, 1941, the patient's vision was O.D., light perception; O.S., 1/60. In December, 1941, vision in the right eye was nil and in the left eye it was 1/60. The tension in the left eye was usually between 36 and 57 mm. Hg.

Since the right eye was blind, and for over two years was known to have chronic hypertension, and because iridectomy had previously been performed, this eye was selected as ideal for experiment. Any reduction of tension which might result could not be attributed to the iridectomy. Furthermore, if this eye, which had so long been damaged, could tolerate the transplant, it seemed fair to conclude that the procedure might be applicable to eyes with much less advanced changes. On January 14, 1942, the right eye was operated on. At this time the intraocular pressure was 40 mm. Hg (Schiötz).

OPERATION

Under general anesthesia (sodium pentothal injected intravenously), 6 mm. of the upper right canaliculus was dissected from the upper lid and freed of connective tissue. It was then immersed in 1:500 metaphen for 10 minutes. A conjunctival flap was dissected. Next the canaliculus was dilated with a puncta dilator, at which time, due to overdistention, it was torn for about one-half its length. Five strands of no. 0 catgut were threaded through the lumen with considerable effort. A keratome incision 3 mm. long was made through the sclera, 2 mm. behind the limbus. The incision was enlarged laterally with scissors. A segment was punched from the anterior margin of the incision, but the obliquity of the incision prevented a complete punch wound from being made. The canaliculus was placed into the wound. The knot could be seen resting on the anterior lens capsule. This was owing to the fact that the canaliculus segment was too long. The conjunctiva was closed. Technically, it was much less difficult to perform this operation on the human eye than it had been to do so on the dogs' eyes.

POSTOPERATIVE COURSE

The first two postoperative days were uneventful. On the third day, due to pressure of the catgut knot, a round spot of corneal infiltration developed at the 12-o'clock position. On the fifth postoperative day a localized grayish exudate formed in the anterior chamber beneath the area of corneal infiltration, and this was continuous with the anterior lens capsule. On the sixth postoperative day there was a rather severe reaction, and a definite hypopyon formed in the lower part of the anterior chamber and lasted six days. It was doubtful if this repre-

sented actual intraocular infection or merely iris irritation. Sulfathiazole was administered by mouth on the third postoperative day, and on the fifth day, a course of typhoid vaccine was begun. These measures controlled the untoward effects of the operation. On the tenth postoperative day the tension was 0 and on the sixteenth day it was 3 mm. Hg. The reaction, while still fairly marked, was receding, the eye was comfortable, and the progress was quite satisfactory. There was a white mass of tissue at the external end of the transplant which seemed to be due to necrosis of the excessive amount of canaliculus outside the sclera. This mass of necrotic tissue was absorbed in about four days. On the eighteenth postoperative day the tension was 14 mm. On the twenty-fourth postoperative day the tension was 17 mm. There was a visible area of localized elevation of the conjunctiva similar to that seen after trephining. The reaction had subsided. The one untoward effect of the procedure was partial opacity in the upper fourth of the lens. It would appear that the graft was successful, and that the canaliculus was filtering aqueous in this case. It seems most probable, how-

ever, that the opening will eventually close.

PROGRESS NOTE

About six weeks after completion of this report the subconjunctival pool of aqueous on the patient's eye disappeared and the tension returned to its preoperative level. The operative field was explored, and it was found that the external end of the canaliculus was closed by subconjunctival scar tissue. A transscleral lacrimal transplant was subsequently performed on this man's other eye and this case will be reported later.

CONCLUSION

In this one case the eye was able to tolerate this operation, and at least a marked reduction in tension was produced during the first three weeks of the convalescence. Further clinical trial seems justifiable, and numerous technical improvements are to be made.

Although it is possible that there have been reports of previous canaliculus transplants, I am unaware of them. This work is still in the experimental stages, and we are not in position to recommend it as a clinical procedure.

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TEST CHARTS REPRESENTING A VARIETY OF VISUAL TASKS*

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To ophthalmologists and others engaged in examining eyes and in servicing them with corrective lenses, visual acuity is a very important visual function. Likewise, common test charts, consisting of "black" characters on a "white" background serve very well their specialized purpose. However, both visual acuity and the common test chart have often led eye specialists into misinterpretations and erroneous conclusions in connection with visual tasks encountered in everyday seeing. Common test charts of high brightness contrast between the test characters and their background fall far short of representing the countless critical visual tasks performed daily for long periods throughout civilized activities.¹

The common test charts, and even more refined test objects, have been designed for determining visual acuity as specifically defined for a limiting condition. Certainly they were not intended for a more extensive purpose without appropriate considerations. Nevertheless, eye specialists have often misinterpreted and extended without justification the significance of determinations arising therefrom. For example, many statements have been made to the effect that visual acuity for so-called normal eyes reaches a maximum at about 10 foot-candles. At best this statement is incomplete and in a practical sense is meaningless. Sometimes such statements are extended to include defective eyes. In such cases it has been stated that for defective eyes to attain maximal visual acuity, the level of illumination must be greater than 10 foot-

candles or even as much as 100 foot-candles. Here again the statement assumes black objects on a white background, which obviously is a special case.

Much confusion has arisen from such statements chiefly because the conclusions are based upon typical test charts or test objects of maximal contrast between the (black) characters and their (white) background and ignore the fact that most visual tasks involve brightness contrasts far below maximal and reflection factors far below that of so-called white surfaces.

At this point it is essential to distinguish between foot-candles and brightness and to recognize the enormous influence of brightness contrast (between object and background) upon visual acuity. Brightness is a combined result of the reflection factor of a surface and of the foot-candles illuminating it. For example, a *foot-lambert* of brightness is produced by one *foot-candle* of illumination if the surface diffusely reflects all the incident light; that is, if the surface has a reflection factor of 100 percent. Some extremely pure white powders approach this value. So-called white papers have reflection factors of 75 to 85 percent. The diffuse reflection factors of most materials vary from those high values to a few percent for dark cloth or so-called black ink to less than 1 percent for black velvet.

It should be obvious that visual acuity as commonly defined is determined by an arbitrary set of conditions that cannot possibly be representative of the infinite variety of combinations of the factors involved. As commonly defined, visual acuity is the reciprocal of the threshold size of a critical detail; that is,

* From the Lighting Research Laboratory, General Electric Company.

of the smallest size of a critical detail involving a "black" object on a "white" background. However, threshold size increases enormously as the brightness contrast decreases. Likewise the influence of level of illumination greatly increases as the brightness contrast decreases. Furthermore, the level of illumination necessary for distinguishing a critical detail of a given reflection factor increases as the reflection factor of the background decreases.

These relationships can be readily illustrated by measurements of "visual acuity" made with test charts on which the same characters are used but with different reflection factors of characters and backgrounds. The A.M.A. test chart was carefully photographed and prints were made with nonglossy photographic paper to exact size. By means of different ex-

posed white backgrounds with a reflection factor of 82.5 percent. The reflection factor of the standard letters of the A.M.A. test chart varied from the usual "black" of chart 1 to a medium gray whose reflection factor was 65 percent in the case of chart 2, to a light gray whose reflection factor was 76.5 percent in the case of chart 3. It would aid in visualizing to note again in table 1 the difference between the reflection factor of the letters and that of the white background in each of these cases and also the effect of these differences upon brightness contrast. This effect is also shown by the following simple formulae.² When the surfaces of the background and of the letters diffusely reflect light and the test chart is uniformly illuminated, brightness contrast, expressed in percent, is equal to

$$100 \times \frac{\text{Brightness of background} - \text{Brightness of letters}}{\text{Brightness of background}}$$

posures of the print and of different degrees of "fogging" of the background a variety of test charts was readily produced. Four of these were selected for

In such a case diffuse reflection factor (DRF) may be substituted for brightness. Therefore, brightness contrast expressed in percent is equal to

$$100 \times \frac{\text{DRF of background} - \text{DRF of letters}}{\text{DRF of background}}$$

the present purpose and the descriptions and essential data are briefly presented in table 1.

In the less common case when the object is brighter than the background, background and object are interchanged in the foregoing formulae.

It will be noted that charts 1, 2, and 3

TABLE 1

DATA PERTAINING TO FOUR TEST CHARTS. REFLECTION FACTORS AND BRIGHTNESS CONTRASTS ARE EXPRESSED IN PERCENT. THE TEST CHARACTERS WERE IDENTICAL IN SIZE AND FORM ON ALL THE TEST CHARTS

Test Chart	Diffuse Reflection Factor		Brightness Contrast
	Background	Letters	
No. 1 Black letters on white background	82.5	2.8	96.5
No. 2 Medium-gray letters on white background	82.5	65.0	21.3
No. 3 Light-gray letters on white background	82.5	76.5	7.3
No. 4 Black letters on dark-gray background	3.3	2.6	21.1

Charts 1, 2, and 3 might be further visualized by placing strips of black, medium-gray, and light-gray papers, cloths, or threads on a white paper or cloth.

Chart 4 has a very dark-gray background, instead of a white one, and the letters are the usual "black." The brightness contrast between the letters and background is practically identical to that

rected to normal by means of eyeglasses. The charts were of standard size and were viewed at the standard distance of 20 feet.

The object of this paper is to illustrate certain principles that are commonly overlooked in interpreting measurements of visual acuity with the usual test charts into the much more complex realm of see-

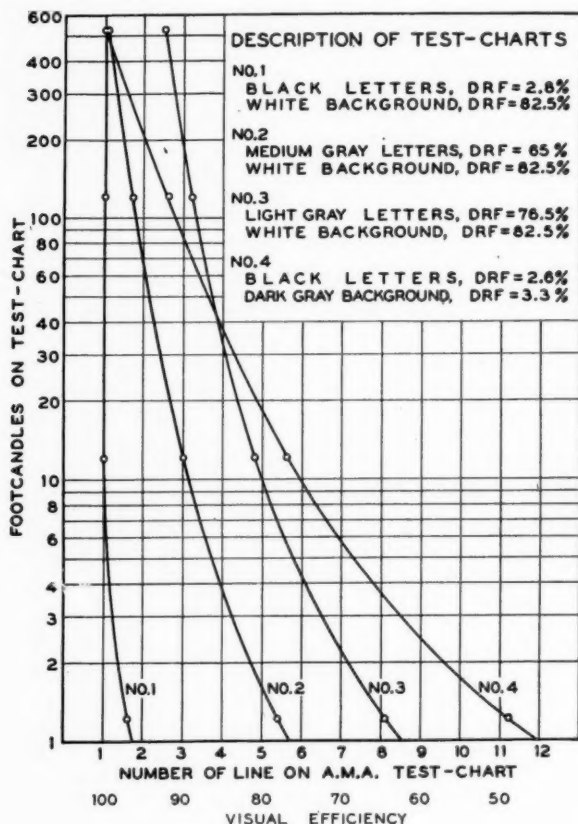


Fig. 1 (Luckiesh). Showing the level of illumination (foot-candles) necessary to make various lines on four different test charts barely readable at the standard distance of 20 feet. Chart no. 1 was the equivalent of the A.M.A. test chart. The other test charts are more representative of many visual tasks encountered in everyday seeing. The data represent the average from 20 subjects possessing so-called normal vision or corrected to normal by means of eyeglasses.

of chart 2. However, there is a great difference in brightness between charts 2 and 4 for the same level of illumination. In fact, to make these two charts identical as visual tasks, the level of illumination must be much greater on chart 4 than on chart 2. This is illustrated in figure 1, which is a plot of average results obtained with a group of 20 subjects possessing so-called normal vision or cor-

ing. Therefore, such a group of subjects is adequate for the purpose.

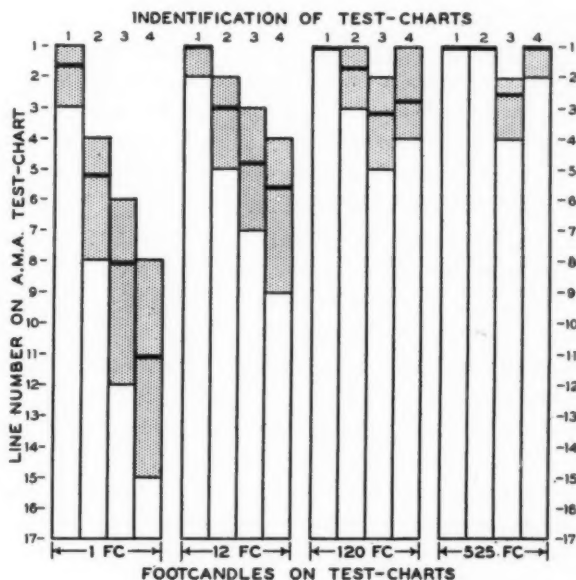
Various interesting facts are revealed by figure 1. It is seen that, on the average, line 3 of chart 4 was barely distinguishable under an illumination of 84 foot-candles. The same line on chart 2 could be barely read under an illumination of about 12 foot-candles.

On the standard chart 1, line 1 (repre-

senting a visual efficiency of 100 percent by A.M.A. rating or 20/20 by Snellen rating) could be barely read under an illumination somewhat less than 10 foot-candles. However, on the average, line 1 on charts 2 and 4 could be barely read under an illumination of 525 foot-candles, or more than 50 times the level of illumination required in the case of the

jects. However, a more important point is that "visual acuity" in everyday seeing is greatly affected by reflection factor, brightness, and brightness contrast. In cases of very low reflection factors and very low brightness contrasts involved in many visual tasks, visual acuity, in a practical sense, does not reach a maximum until levels of illumination of hun-

Fig. 2 (Luckiesh). Data obtained with the four different test charts under four different levels of illumination. The shaded area represents the "spread" in each case among the 20 subjects possessing normal vision or corrected to normal with eyeglasses. The bold horizontal line in each shaded area represents the average line in each case which is barely readable by all subjects. The white area in each case represents the lines on each test chart which could be read by all subjects under each of the four levels of illumination, respectively.



standard chart 1. Line 1 on chart 3 could not be read under any level of illumination, even thousands of foot-candles.

The lessons taught by figure 1 should be obvious. Certain categorical statements or generalizations that have been made are indefensible and even ridiculous. The statement that visual acuity, determined by black characters on a white background, reaches a maximum at about 10 foot-candles is based upon the common black-on-white test chart. This is by no means true when determined by more refined devices, for visual acuity continues to increase up to and beyond 100 foot-candles for black-on-white test ob-

jects and even thousands of foot-candles are reached.

Imagine, for example, garment workers sewing with black thread on dark goods. The ordinary test chart, within its limitations, is suitable for determining refractive errors of their eyes, for prescribing certain corrections in eyeglasses, and for measuring visual efficiency in its limited fundamental sense. However, if the eye specialist is to extend his analyses to the task the garment workers perform and to comments on lighting and to specification of foot-candles, he is inadequately equipped with data. He would span a great portion of the gap if he used a test chart such as chart 4. Immediately he

would find that, on the average, under an illumination of 10 foot-candles, lines 1 to 6 on chart 4 are not readable as indicated in figure 1. From a practical viewpoint he might properly conclude that the average visual efficiency was 75 percent or vision was 20/50. He would also find that more light is the only practical aid available and would have to use higher levels of illumination if lines 1 to 6 are to be readable.

If the eye specialist carried the test far enough with this universally essential factor, he would find that 100 foot-candles increased "visual acuity" and "visual efficiency" for the garment worker engaged in his everyday tasks. He would also find that by increasing the level of illumination this worker would be progressively aided. Eventually he would reach several hundred foot-candles, such as are available at some windows or on some porches in the daytime. Continuing upward, he would reach 1,000 foot-candles and more. If the eye specialist were examining the group used in the present work he would find that on chart 4 he would have to have 525 foot-candles on the average for all the subjects to reach a "visual efficiency" of 100 percent.

In figure 2 are presented the "spreads" of the determinations made with these four test charts under four levels of illumination. It is emphasized that the 20 subjects had so-called normal vision or their vision had been corrected to normal with the use of eyeglasses. The shaded area in each case represents the spread for the 20 subjects, and the horizontal bold line in this shaded area represents the average of all subjects. Some of the subjects could read line 1 of the standard chart under 1 foot-candle and nearly all of them could do so under 12 foot-candles. The latter level of illumination produced a brightness of the white background on chart 1 (also on charts 2

and 3) of approximately 10 foot-lamberts. Under an illumination of 120 foot-candles, some of the subjects could read line 1 on chart 2, but only 10 percent of the subjects could read this line on chart 4. Under an illumination of 525 foot-candles, all could read line 1 on chart 2, none could read line 1 on chart 3, and only 70 percent of the subjects could barely read line 1 on chart 4. Actually, the illumination necessary to barely read line 1 on chart 4 varied from about 125 foot-candles for one subject to approximately 1,000 foot-candles for two subjects. Only 30 percent could read this line under a level of illumination of 525 foot-candles, which was the average "threshold" illumination for the entire group.

It should be noted that the diffuse reflection factor of the background of chart 4 being 3.3 percent, the brightness of this background when illuminated by 525 foot-candles is 0.033 times 525 or about 17 foot-lamberts. Only 21 foot-candles is necessary to produce this same brightness of the white background of chart 1. In addition to the need for 25 times more foot-candles to make the background of chart 4 equal in brightness to that of chart 1, still more light is necessary in the former case to make up for the relatively low brightness contrast. As a consequence, line 1 on chart 4 is only barely readable on the average under 525 foot-candles, whereas on chart 1 it is barely readable under somewhat less than 10 foot-candles for this group of subjects with so-called normal vision. Incidentally, from adequate knowledge of the visual characteristics of this group it is sufficiently representative for the purposes of this investigation.

Again imagine a group of garment workers sewing with black thread on dark cloth. The foregoing illumination values are for "barely seeing." No factor of safety is included for easier seeing. In addition, no allowance is made for old

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eyes or defective eyes. No allowance is made for the fact that the percentage of ocular defectiveness is high among garment workers. Surveys have shown as high as 78 percent of garment workers have eye defects.³ All these facts provide food for thought besides revealing the gross faultiness of statements carelessly made as to the adequacy of 10 or 20 foot-candles.

From the data presented one may consider numerous visual tasks. The choice of garment workers is of no particular significance. They were used merely to direct attention to a specific case. Illumination has been emphasized because there is no other means of increasing "visual acuity" and "visual efficiency" to a high level for the countless tasks not represented by black-on-white test charts. The eye specialist will do well to realize that his experience, tools, techniques, and interpretations in connection with his work on eyes and knowledge of vision have limitations when he considers the visual tasks in the world of seeing.

SUMMARY

The author has no quarrel with the test charts in common use nor with the overwhelming importance assigned to visual acuity for the eye specialist's use in his specific practice. However, visual acuity and the common black-on-white test charts have gross limitations when applied to everyday seeing.

Contrast sensitivity, or the ability to see differences in brightness, is a very important factor in seeing. At night, on the highway, for example, it far outweighs visual acuity in importance.⁴ In everyday visual tasks at ordinary levels

of illumination, brightness contrast or the difference in brightness between an object and its background, has a very great influence upon threshold size, and therefore, upon visual acuity.

The literature contains many misinterpretations and erroneous statements pertaining to necessary or desirable levels of illumination, owing to the inadequate basis provided by considerations of visual acuity based upon black-on-white test charts and test objects. This has led to misunderstandings and in some cases to unfair as well as unsound attacks upon specifications of foot-candles. It is tempting to quote some of these statements which in the light of adequate knowledge are ridiculous. However, this would serve no essential purpose that the data in this paper do not adequately fulfill.

The visual tasks that are being performed by millions of persons for long hours daily are not represented even remotely by the common black-on-white test charts, which are examples of the easiest tasks of critical seeing. Test charts such as numbers 2, 3, and 4 are representative of many critical tasks of seeing, and the four charts at least span much of the range of everyday visual tasks. It is seen that levels of illumination of 100 to 1,000 foot-candles are necessary for barely seeing line 1, which represents a visual efficiency of 100 percent or 20/20 vision.

The author acknowledges the valuable work of A. A. Eastman, T. J. Borsch, G. P. Kerr, and T. Knowles in making and calibrating the test charts and in obtaining the data.

Nela Park.

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NOTES, CASES, INSTRUMENTS

A CASE OF ACUTE METASTATIC DACRYOADENITIS

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That acute dacryoadenitis is a rarity may be readily appreciated when one realizes that men like Arlt and Schirmer stated that they had never seen a case of



Fig. 1 (Rosen). Acute metastatic dacryoadenitis.

this disease in the acute phase. The recent excellent review of this condition by Richardson¹ suggested that it is so rare that all cases should be reported.

S. B., aged 20 years, was admitted as a patient at the Station Hospital on December 15, 1942, suffering from a mild acute, suppurative, nonvenereal penile lesion of undetermined cause. It was associated with an acute, right, inguinal lymphadenitis. The patient had noticed the penile lesion about three weeks prior to admission to the genito-urinary service and stated that he had been exposed one week earlier. Pertinent in his past history was the fact that he had had an attack of gonorrheal urethritis in 1940 and in 1941. He denied the existence of any previous penile lesion. The physical examination was negative except for "multiple irregular ulcers in the coronary sulcus on and around the frenulum, and a hard, painful 'bubo' in the right groin." Saline dressings and sulfathiazole 5 percent (powder)

were ordered for the penile lesion and sulfathiazole was given internally.

Three negative dark-field examinations were secured and negative Wassermann and Kahn tests were reported. The Frei test after 72 hours was reported as negative. On December 21, 1942, the urologic service made the following notation: "At the present this appears to be a non-specific lesion due to trauma incurred at the time of intercourse."

On December 20, 1942, the right eye became red, edematous, and swollen. The involvement was suspected of being an early conjunctivitis and was treated accordingly. The eye continued slowly to become worse notwithstanding frequent boric-acid applications, and it was noted that the condition appeared much worse in the 24 hours just prior to the requested ophthalmologic consultation.

The patient recalled that during the attack of "gonorrhea" in 1941 he had had a similar involvement of his right eye, it having been inflamed, red, tender, and swollen at its lateral aspect. He had received no medication for this ocular condition, yet these symptoms disappeared in 8 or 10 days. He did not recall that any secretion had been present and did not believe that there was any degree of pain at any time during the course of the ocular disturbance.

On December 26, 1942, the patient was referred to the eye clinic because of the increase in pain, tearing, redness, and secretion in the right eye. The eye and lid had become tense and painful in the upper temporal portion. Upon this initial examination the outstanding features included a peculiar violaceous congestion of the temporal half of the bulbar conjunctiva of the right eye together with an edema of the outer third of the upper lid,

producing a characteristic *italic letter-s curve* with the long axis of the "s" in a horizontal meridian. When the temporal third of the lid was raised upward, a mild chemosis of the palpebral conjunctiva was evident. This had not extended to the bulbar conjunctiva. As the lid was pulled up the lacrimal gland readily prolapsed into view. It was extremely injected, thickened, cyanotic, and glassy in appearance (fig. 1). In extent it ran well on toward the center of the lid, gradually tapering as it continued in this direction. When the examiner's index finger was placed along the lateral portion of the external orbital margin it was quite evident that the normal sharp edge of this area had become rounded off by a more or less firm swelling. This area was not extremely tender, although eversion of the lid produced excessive pain. Many subconjunctival hemorrhages were present in the upper outer portion of the bulbar conjunctiva.

In 24 hours the acute dacryoadenitis had become progressively worse and now involved the orbital as well as the palpebral portion of the lacrimal gland. This gland showed an increased tenderness and a brawny induration and it prolapsed into the cul-de-sac. The right eye showed some exophthalmos. In looking to the right and up diplopia occurred, due to restricted motion of the eye in this direction. The upper temporal quadrant was the area most involved, but some of the congestion had now spread to the lower temporal bulbar conjunctiva. There was slight preauricular adenitis along with temperature elevation of 1.5 degrees. Smears and cultures of conjunctival secretion, blood count, blood chemistry, and sedimentation rate revealed no significant findings. The urine specimen showed many white blood cells.

This acute phase persisted for three days without any improvement, and a bi-

opsy was contemplated for diagnostic purposes. On December 29th, there was definite improvement for the first time, the gland having become smaller and the congestion appearing less intense. On December 31, 1942, it was noted that the gland was rapidly shrinking and that there was evidence of fluid substance in the gland, which now resembled a large sac. The normal sharp border of the supraorbital margin had returned, and the intense violaceous congestion had begun to disappear.

On January 3, 1943, the eye showed a great improvement, very little swelling, redness, and pain being present. The penile and glandular lesions had all healed by this time, and the patient was discharged from the Hospital on January 7, 1943. Daily conjunctival smears failed to show any gonococci. No acute conjunctivitis was present at any time and the lacrimal gland was not involved by any direct extension. At no time was there any involvement of the cornea, anterior chamber, iris, lens, vitreous, or retina. The diplopia when the eyes were up and right was present for a period of four days only. The vision in each eye was 20/20 and remained so throughout the period of observation. The originally described conjunctival hemorrhagic areas were completely absorbed at the end of two weeks, at which time most of the redness and swelling had disappeared.

It is interesting to note that in Richardson's case there were repeated negative cultures and smears for gonococci, but when a complement fixation test was performed the reaction was reported as positive. This, however, could not be performed in the present case. It has also been pointed out that this condition shows a tendency toward recurrence. Although no positive etiologic factor was ascertained and although gonorrhea was not established as the cause of this complica-

tion it is well known that the condition involving the lacrimal gland may arise from a source where the organism has remained dormant, such as in the very vascular portion of the prostate. This would appear to be particularly true in cases where a previous urethritis had existed and had not been treated adequately. The

fact that in this case there is evidence of recurrence of the dacryoadenitis and that a similar previous attack had occurred during an acute urethritis would strongly make one suspect a related etiologic factor.

Station Hospital.

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CONGENITAL CYST OF THE OPTIC NERVE*

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Miss B. K., aged 19 years, appeared at Dr. Bernard Samuels's Clinic at the New York Eye and Ear Infirmary on December 3, 1942. She was apparently a normal, healthy individual, of average size and intelligence. She complained of slight symptoms of eyestrain.

Her vision was 20/20 in the right eye and 20/20 in the left eye. There was no external abnormality and no muscle imbalance. Her refractive error was, O.D. -0.25D.sph. \approx +0.50D. cyl. ax. 180°; O.S. +0.50D. cyl. ax. 180°.

The fundus of the left eye was perfectly normal. That of the right eye, however, showed a cystic mass $1\frac{1}{2}$ discs in diameter, extending from the limit of the upper third of the disc down and out below the disc. This cyst was somewhat oval in shape with 6D. elevation, and was moderately translucent. The surface of the cyst wall was covered by small blood vessels. The retinal vessels behind the cyst appeared to be normal,

entirely unaffected by the presence of the cyst (plate 3, fig. 1). The blind spot of the left eye was normal, as was also the visual field. The blind spot of the right eye was four times larger than normal, and the visual field was definitely cut on the temporal side to 55 degrees for a 3-mm. white test object on the perimeter (fig. 2).

The family history was negative except for the fact that the mother had a right convergent squint. Her fundus was normal. A brother, aged 10 years, also showed a normal fundus.

In February, 1943, I saw another patient, a boy, S. B., aged 16 years, whose fundus disclosed a flat connective-tissue cystic area similar to the one reported, over the disc of the left eye. This area did not appear quite so definitely cystic. I have not as yet obtained a photograph of the fundus.

The embryonal hyaloid canal, known as the canal of Cloquet, is the basis for many anomalous pictures.

These were well classified by DeBeck¹ in 1890. His classification refers to 12 different phases. These are as follows: 1. Shred of tissue on the optic nerve. 2. Membrane on the disc. 3. Cystic remains on the disc. 4. Massive connective tissue on the disc. 5. Rudimentary strand at-

* Presented at the meeting of the Ophthalmologic Section of the New York Academy of Medicine, May 17, 1943.

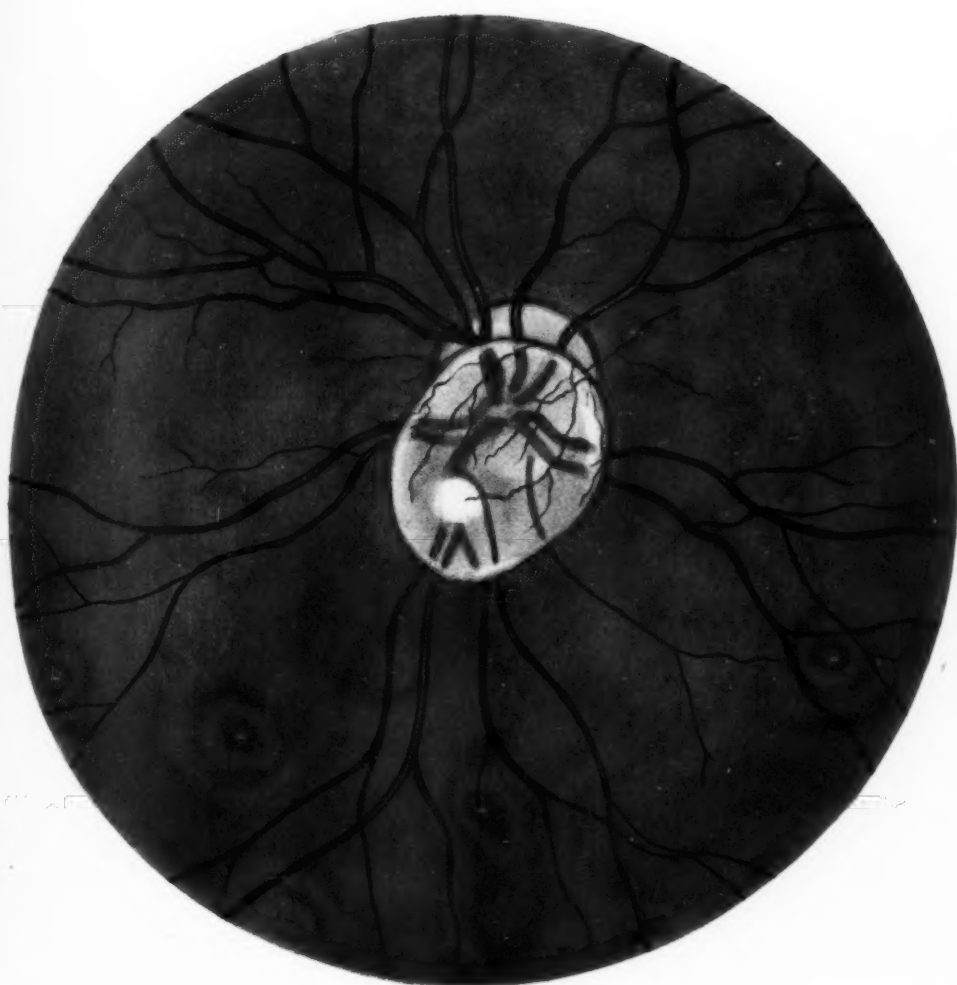


FIG. 1 (AGATSTON). CONGENITAL CYST OF THE OPTIC NERVE

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tached to the disc. 6. Strand on the disc and posterior capsule of the lens. 7. Strand from the disc to the lens. 8. Similar strand containing blood. 9. Strand

In 1906, Parsons³ in his "Pathology of the eye," mentions a case which showed a large blindspot but no contraction of the visual field.

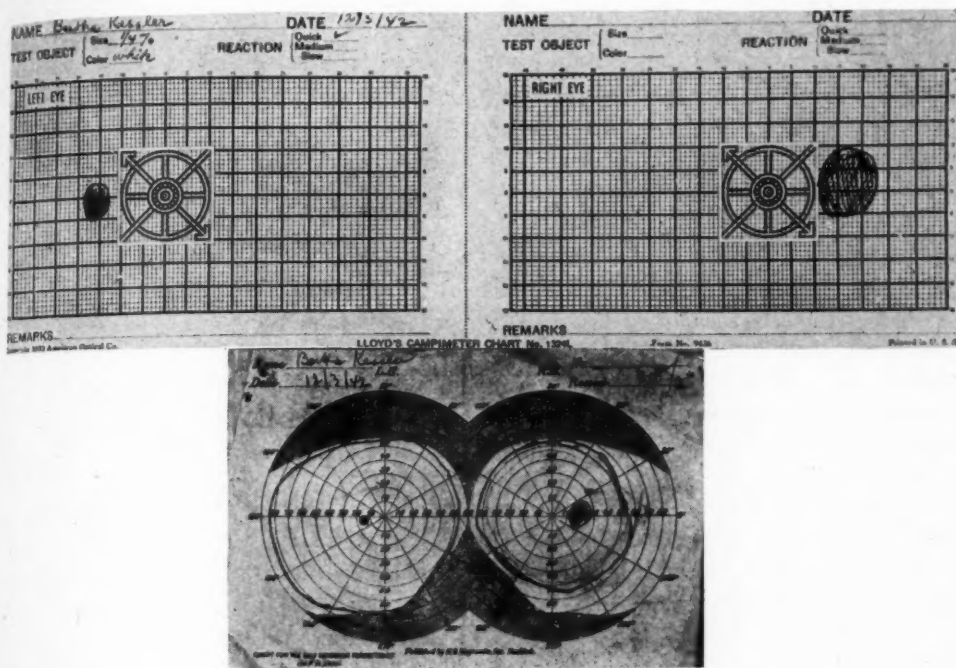


Fig. 2 (Agatston). Visual fields in a case of congenital cyst of the optic nerve.

attached to the lens alone. 10. Posterior capsular cataract. 11. Striae on the posterior lens capsule. 12. Persistent canal, without remnant of the vessels.

This is a quite comprehensive list although many other familiar variations are seen.

Cystic prepapillary remains have also been reported by Randall² in 1888.

Hunter W. Scarlett⁴ reported a case in 1922, and Yudkin⁵ reported one in 1926.

In 1939, Levitt and Lloyd⁶ reported a prepapillary cyst, containing a moving vascular loop. The blindspot was markedly enlarged and the visual field was also somewhat contracted.

875 Fifth Avenue.

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A RATIONAL BASIS FOR CROSS-CYLINDER TESTS

JOSEPH I. PASCAL, M.D.
New York

The how and why of cross-cylinder tests can be more easily understood by a study of the diffusion spots that make up the retinal image in an astigmatic eye than in any other way. It can be shown that when the astigmatism is changed to equally mixed astigmatism, the effect of flipping the cross cylinder is to change the *size* of the retinal diffusion spots without changing their form. Images made up of larger or smaller diffusion spots of the same *shape* can be easily compared as to clearness, the image made up of smaller diffusion spots naturally being the clearer.

To clarify the basis of the procedure it would be well to redefine a few of the terms used. "Fogging" means to make an eye myopic by means of a plus sphere if it was not "fogged" or myopic to start with. In the presence of astigmatism, simple or compound, "full fogging" means making both principal meridians myopic. "Half fogging" means making one principal meridian emmetropic, the other myopic. "Unfogging" may be used to mean leaving the examined eye hyperopic or making it so by means of minus spheres. In the presence of astigmatism, simple or compound, "full unfogging" implies both meridians being hyperopic, "half unfogging" implies that one meridian has been made emmetropic, the other hyperopic. "Meridionally balanced" or simply "balanced" means that, where astigmatism is present, one meridian has been made myopic, the other hyperopic; in other words, the astigmatism has been changed to mixed astigmatism.

Using these terms in the sense outlined we can say that cross-cylinder tests made while the examined eye is "fogged"

(fully or half), or "unfogged" (fully or half) are difficult, often unreliable, and sometimes even misleading. But if the tests are made after the eye has been "balanced," as nearly as possible evenly balanced—that is, as strongly hyperopic in one meridian as it is myopic in the other—then the tests are more effective, more definite, and free from misleading clues. The reason for this is that only when the eye is balanced, do the two positions of the cross cylinder produce diffusion spots that are readily comparable. These spots are diffusion *circles* (in a physiologic not a geometric sense) of *different sizes*. Whereas when cross-cylinder tests are made on an eye that has not been previously "balanced" the diffusion spots resulting from the two positions of the cross cylinder differ in *size* and *shape*, leading to difficulties in comparison and sometimes even to misinterpretation. I think even Dr. Crisp's new ingenious test for axis described in this Journal for June, 1943, would work more smoothly if the eye or photographic camera was first balanced rather than half-fogged.

Possibly the long-delayed realization of this cardinal principle in cross-cylinder tests was due to the way the imperfect focusing in an astigmatic eye was diagrammatically presented. The usual method was by diagrams showing the position of the two focal lines and their shifting back and forth by means of spheres and/or cylinders. If the real entity that enters into the formation of the retinal images—namely, the retinal diffusion spot—is studied, the principle and importance of "meridional balancing" at once becomes apparent.¹

Williamson-Noble has amplified the procedure and in a series of striking photographs has shown the principles involved as no other method can. In order to maintain "meridional balance," Wil-

Williamson-Noble makes a most excellent suggestion; namely, to use the duochrome test, better known here as the bichrome test.² This paper should be read by every eye physician. Another amplification of the subject, showing how the "balanced"

condition can be maintained throughout the test by means of *correcting* cross cylinders as well as *testing* cross cylinders, has been published by the writer.³

37 West Ninety-seventh Street.

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AN ILLUMINATED RETRACTOR FOR EYE OPERATIONS ESPECIALLY FOR DETACHMENT OF THE RETINA*

CONRAD BERENS, M.D.
 New York

Because of the need for good illumination in operations for detachment of the retina, orbital operations, and operations on the inferior-oblique muscle, an

illuminated retractor has been devised. This may be inserted into a flashlight handle (fig. 1) or attached to a cord and rheostat. The retractor is of plastic material, the handle is 51 mm. long, and the tip 18 mm long by 8 mm. in diameter. The tip forms an angle of 165 degrees with the handle. The tip is concavo-convex to facilitate the manipulation of electrolysis and diathermy tips and needles in the hollowed-out part.

The tip is slightly frosted to project the light onto the scleral surface.

35 East Seventieth Street.

A COLOR FILTER FOR RETINAL PHOTOGRAPHY*

FERDINAND L. P. KOCH, M.D.
 New York

It has become necessary for many who use the carbon-arc models of the Zeiss-Nordenson retinal cameras for color delineation of the eyegrounds, to decelerate their activities in this respect because of the relative scarcity of daylight Kodachrome film in the bantam pack (K828), although those who work with the later nitra-lamp instruments still are able to

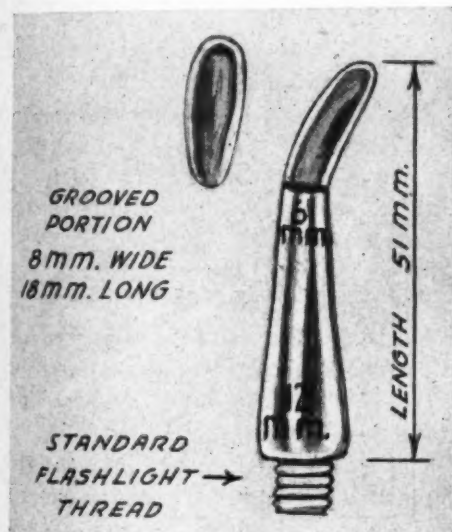


Fig. 1 (Berens). An illuminated plastic retractor.

*This study was aided by a grant from the Ophthalmological Foundation, Inc. Made by V. Mueller & Company, Chicago, Illinois.

*From the Departments of Ophthalmology of the College of Medicine, New York University and Bellevue Hospital.

obtain the artificial-light Kodachrome (K828A). The latter, perhaps, does not afford quite so true a coloration as does the former but it is adequate. Similar, reasonably true values may be attained with carbon-arc illumination and artificial-light color film if one resorts to the expediency of using an accessory filter.

This may be done inexpensively with the use of a Type A, C4-Harrison filter, which may still be purchased on the open market. One may obtain it in various sizes according to whether the operator

of the camera wishes to place the filter in front of the objective lens at the patient's end of the photographic tube or to have it reground for placement in the small, removable filter frame that is received into a slot in the stationary vertical tube situated between the shutter housing and the prism-placement grouping just to the rear of the source of illumination. It is not necessary with this device to alter one's amperage and exposure tables.

780 Park Avenue.

SOCIETY PROCEEDINGS

EDITED BY DR. DONALD J. LYLE

CHICAGO OPHTHALMOLOGICAL SOCIETY

November 16, 1942

DR. LOUIS G. HOFFMAN, *president*

CLINICAL MEETING

(Presented by the Department of Ophthalmology, University of Illinois)

BILATERAL OPTIC-NERVE ATROPHY (JUVENILE TABOPARESIS)

DR. MARTHA RUBIN FOLK presented the case of A. K., a 16-year-old boy who, when first seen on September 4, 1912, complained of blurring of vision for a period of four years. Vision was 0.1 in each eye. The pupils were unequal in size, the right measuring 4 mm. and the left 3.5 mm.; the left pupil reacted sluggishly to light. Upon ophthalmoscopic examination, the optic papilla was seen to be pale, with clear margins and narrowing of the vessels. Perimetric study showed concentric contraction of 20 degrees of both visual fields to form and color. Homat-

ropine refraction revealed an error of R.E. +2.75D. sph. \approx +0.25D. cyl. ax. 180°, vision 0.1; L.E. +2.50D. sph., vision 0.1.

The blood Wassermann reaction was 4+, and 1+ Kahn. Colloidal gold curve of the spinal fluid showed 5321555300.

Diagnosis made by the Department of Neurology was that of central-nervous-system syphilis with the possibility of early taboparesis. Antisyphilitic therapy was instituted.

CONGENITAL ABSENCE OF LEFT PUNCTA

DR. ROOSEVELT BROOKS presented H. B., a man, aged 22 years, who was referred by the Selective Service Board for correction of tearing in the left eye.

On examination, the right eye was found to be entirely normal. The left eye was watery but the conjunctiva was not injected. Complete absence of the puncta above and below was found. No opening of the lacrimal sac could be found in the nose and it was assumed that the sac was also absent.

Operation: An incision was made in the skin slightly nasalward to the position of the lacrimal sac and the nasal bone was exposed, through which an opening was made into the nose. A double silk-worm gut suture was passed from the lid margin at the site of the puncta into the wound, then into the nose. The lower end of the suture was brought out of the nose and fastened to the cheek. One week later a small silver tube was threaded over the silkworm suture into the nose and the sutures were then removed. The end of the tube in the nose was bent downward, the upper end was bent nasalward over the bridge of the nose and fastened by adhesive tape.

It was hoped that by this procedure epithelization would occur. No record of a similar case was found in the literature.

PEMPHIGUS OF THE CONJUNCTIVA

DR. CARL APPLE reported the case of a woman, aged 71 years, who had a purulent discharge from the right eye for two years, and from the left eye for six months. Following bronchitis two years ago, she had continued sore throat, choking spells with hemoptysis, and blisters on the tongue, which bled at times; there were ulcers on the palate, tongue, pharynx, and epiglottis. Dysphagia had been present for a year and a half.

X ray of the lungs showed negative findings; sputum was negative for acid-fast bacilli; smears were negative for fusiform bacilli or spirochetes; blood Wassermann test was negative. The blood count showed 4,500,000 red cells; 11,500 white cells: 41 percent lymphocytes, 48 percent neutrophils, 4 percent eosinophils, and 7 percent mononuclears.

Pemphigus of the conjunctiva usually occurs with lesions of the mucous membranes of the mouth, throat, and nose; rarely in conjunction with eruptions upon

the skin. Bullae are exceptional; denuded areas are found in the conjunctiva, which rupture from pressure of the exudate beneath and result in scarring, with final constriction and disappearance of the retrotarsal folds and adhesion of the lids to the bulb. Ulcers of the cornea may occur in the late stages.

DERMATOLOGIC LESIONS ABOUT THE EYES

DR. OLIVER S. ORMSBY read a paper on this subject which was published in this Journal (August, 1943).

Discussion. Dr. Robert Von der Heydt inquired about riboflavin deficiency, and whether this treatment was given in cases of acne rosacea with involvement of the nose and "butterfly" lesions on the cheeks. With reference to the eye changes in lupus erythematosus, this condition involves the eye but little in comparison with the skin, and these patients are almost exclusively seen and treated by dermatologists.

Dr. Sanford Gifford asked whether the Macht test is considered to be of diagnostic value in pemphigus. In 8 or 10 cases the tests had been reported as highly toxic. Dr. Ormsby had mentioned the deep lesions in the cornea caused by pemphigus, but in his own experience, while there is scarring, the lesions are very superficial; the bullae rupture and there remains but a little erosion, with no hypopyon. It seems that the epithelium is chiefly affected, and is replaced by thick horny epithelium that covers the cornea.

Dr. Ormsby, in closing, said with reference to the effect of light in producing lesions or causing exacerbation of symptoms in rosacea and pellagra, there is a definite influence on the last-named disease. In Peoria and other state institutions some years ago, while pellagra was being investigated, fenestrated gloves were used on many patients and the hands were exposed to the sun. In the

open areas of the gloves pellagrous symptoms developed very actively. On the other hand, many patients were seen who developed lesions in areas not coming in direct contact with the sun's rays. One elderly patient who had been bedridden for years was in a comparatively dark room; the pellagra was well developed and the cutaneous lesions were very active. It is not believed that the actinic rays produced pellagra but that they are effective in bringing out the lesions in a sensitized skin. Goldberg, who did the remarkable work on food deficiencies in pellagra, stated that during winter months (when patients in the South have little pellagra-preventive foods) vitamin deficiencies occur that cause an acute outbreak in the spring when the sun's rays become more potent. Most of the cases occur from March to June. The part that hematoporphyrin plays in sensitizing the skin in these patients is debatable. No particular effect has been observed of the sun's rays on rosacea.

Ocular tuberculosis associated with tuberculosis of the skin is quite common; this was not discussed here for lack of time. Lupus erythematosus of the conjunctiva and lids was mentioned because this condition has been recognized only for a few years; if attention is called to it more cases will be detected. As it can be cleared up with treatment, a proper diagnosis is valuable to the patient.

Concerning the effects of riboflavin in rosacea, very little effect has been seen on the cutaneous lesions, but a decided effect has been noted on the ocular lesions associated with rosacea.

The description of ocular pemphigus was made as a composite of a large number of cases recorded all over the world by dermatologists and ophthalmologists, particularly the latter. In the early stages the vesicles are always superficial and usually leave without trace. Later, when

the disease attacks deeper tissues of the eye and sclerotic changes occur, vesicles no longer develop, although they may be found on other mucous membranes. The Macht test is used as a confirmatory finding; a positive test is valuable in confirming the diagnosis of pemphigus. It is a phytopharmacologic method of testing the toxicity of the blood serum for plant protoplasm. In about 90 percent of patients with pemphigus the blood serum shows greater toxicity than that of normal persons.

As most cases of contact dermatitis are of allergic or hypersensitive nature, and as sodium thiosulfate is the most valuable drug in overcoming sensitization, we have found it of great value in this type of dermatitis. It is used in dosage of one gram intravenously three times a week for a week or 10 days. Two excellent local applications consist of the aqua calcis lotion and a naftalan ointment. The first preparation contains sodium biborate 10 grams, powdered zinc oxide 15 grams, powdered starch 15 grams, liquor calcis 120 grams, and aqua rosa q.s. ad 240 grams. A very efficient ointment consists of naftalan 6 grams, powdered zinc oxide 15 grams, powdered starch 15 grams, and petrolatum to make 60 grams. It has not been found necessary or advisable to use phenol in the aqua-calcis lotion.

THE USE OF PRISMS IN OPHTHALMOLOGY

DR. GEORGE P. GUIBOR presented a paper on this subject which appeared in this Journal (August, 1943).

Discussion. Dr. Richard Gamble said that he had had the opportunity of watching Dr. Guibor develop his ideas and put them to use. The theories are fascinating and the results are good. The most valuable suggestions he made are the explanation of overaction of the inferior oblique muscle by synkinesis, the use of prisms, base out, undercorrecting the deviation

in convergent concomitant squint, and the use of prisms, base out, for external-rectus paralysis.

His explanation of the reason for overaction of the inferior-oblique muscle is the only one that seems reasonable. It is usually not possible to demonstrate paralysis of the superior rectus of the opposite eye to one's satisfaction. Another important point is the fact that overaction of the inferior-oblique muscle is extremely common in children but is very seldom seen in adults. This would not be true if it were due to paralysis of the superior rectus of the other eye.

In regard to the use of prisms, base out, undercorrecting the deviation in convergent concomitant squint, one likes to think of the first page in Traquair's book on "Perimetry," in which he refers to the visual field as a "hill of vision in a sea of blindness." In this hill the peak corresponds to the fixation point, the hill slopes off gradually on each side of the peak for about 10 degrees, then slopes off rapidly. The use of prisms, base out, undercorrecting the deviation would be an attempt to make the image fall on the side of this hill, and the eye should then move out sufficiently to have the image fall on the fixation point. If this is so, why did Dr. Guibor not order prisms correcting all the deviation less 10 degrees, instead of correcting much less? It is disappointing that he finds that the use of prisms in this manner is not effective in cases of abnormal retinal correspondence. Would Dr. Guibor make a more definite statement concerning the value of prisms in cases of alternating convergent squint? are they less effective than in cases of monocular squint?

With reference to the use of strong prisms, base out, in cases of paralysis of the external-rectus muscle, he was not so enthusiastic as the essayist. It seems he is doing very little more with these un-

sightly lenses than the patient does by merely turning his head toward the side of the paralyzed muscle. The important point is whether or not there is contracture of the internal-rectus muscle. If that develops before the paralysis recovers it will take more than prisms, base out, to relieve it.

Dr. George P. Guibor, in closing, said that motor defects are always undercorrected with prisms because one is unable to determine the amount of spasticity present. Likewise, it is easier to add more prism to a deviation that is not improving than to remove prism from a patient who is using full correction.

Dr. Gamble is correct in his criticism of the use of prisms in treating paretic deviation, especially so when these deviations are associated with severe suppression and contracture of the opponent muscle. However, in partial defects not associated with contracture, prisms are of considerable value.

Robert Von der Heydt.

SAINT LOUIS OPHTHALMIC SOCIETY

November 27, 1942

DR. LESLIE DREWS, *president*

DENDRITIC ULCER

DR. F. O. SCHWARTZ read a paper on this subject which was published in this Journal (1943, v. 26, p. 394).

Discussion. Dr. M. H. Post said that he had noticed repeatedly that dendritic ulcers heal rapidly on removal of foci of infection, but he had a feeling, too, that this disease is self-limiting to some extent. He had seen cases in which no foci of infection could be found, in which the lesion resisted all local treatment, but, continuing this same local treatment, something took place in the system, and

the eye suddenly healed very rapidly. He said that he had not had much luck with the thermophore in this type of lesion.

Dr. Post said that Dr. John G. Bellows had issued a word of warning about the use of sulfa drugs in lesions of the cornea. Since the action takes place only in vascularized tissue, there is a tendency for these drugs to induce vascularization of the cornea in the region of the ulceration.

Dr. William Shahan said he had found that local applications of 1-percent silver nitrate used very cautiously, tracing the open branches of the ulcer, make them well in three or four days. Of course, when the cases are protracted he also sent the patient to some rhinologist and then to the family doctor.

Dr. Roy Mason said he would like to ask Dr. Schwartz about his case in which the patient was struck by the limb of a cherry tree. He had had a number of these cases preceded by some sort of trauma. One patient got cement dust in his eyes. In a few days he developed a dendritic ulcer. Did the accident activate it or aggravate it? There are very good textbooks that fail to answer this question, but give the impression that trauma has something to do with dendritic ulcer. He has felt that the condition was not due to trauma but, like Dr. Schwartz, to some virus or toxin. So many cases, however, are preceded by slight trauma.

Another phase of the subject is the use of the sulfa drugs. He has been using sulfathiazole internally in these cases and it seemed to him that the patients have been getting well much faster than before.

Dr. F. O. Schwartz (closing) in answer to Dr. Shahan, said he used the thermophore at 154°F. for one minute.

He had seen a number of cases of dendritic ulcer following injuries; about half a dozen patients had been improved

after the removal of corneal foreign bodies but had returned in a week or 10 days with dendritic ulcer. He was inclined to think the injury paved the way for the development of the ulcer. He had never seen the condition occur in both eyes.

CORNEAL RESECTION FOR DYSTROPHY

DR. VINCENT L. JONES presented the case of a woman, aged 43 years, who had come under his observation in March, 1939. The corrected vision in each eye had been 20/20. Corneal dystrophy or degeneration (without gutter formation) progressed from the periphery until, in February, 1942, the entire cornea in each eye was involved. Vision was limited to the detection of gross motions.

On May 11, 1942, corneal resection was performed, following the method of Meyer Wiener. Erythema doses of X rays were given under the direction of Dr. Sherwood Moore. Healing was uneventful. On August 21st, vision in this eye was 20/400, and on November 25th the vision had improved to 20/200.

Discussion. Dr. William James pointed out the need for better terminology to avoid confusion in discussing corneal conditions. In obscure, so-called dystrophies of the cornea he had used corneal resection in seven cases; four received beneficial results. Yet after about four or six months the cornea became opaque from what he judged was edema. The patients were not benefited permanently at all. To resect down to firm healthy tissue is worthwhile in a great number of cases of scars and erosions of the cornea.

Dr. John Green wished to commend Dr. James on his technique of corneal resection. Dr. James was kind enough to assist him in one case. It was a beautiful demonstration of how the scar tissue can be dissected off in the proper plane of dissection.

In cases of bullae it was quite remarkable how one can get rid of them without regeneration. Not only Ewing but Allen of Chicago showed that the genesis of a bullous keratitis was a disease of Bowman's membrane. If one removes the superficial layers of the cornea including Bowman's membrane a quiet eye will result. Most of his cases had been in blind eyes that could not be removed for some reason.

James H. Bryan,
Editor.

COLORADO OPHTHALMOLOGICAL SOCIETY

November 28, 1942

DR. JAMES M. SHIELDS, *president*

DETACHMENT OF THE RETINA AND CATARACT EXTRACTION

DR. WILLIAM M. BANE presented the case of Mr. R. B., aged 23 years, who was examined by Dr. J. L. Swigert on December 1, 1933. He had symptoms of eye strain with some blurring of vision and a chronic facial eczema. His vision was O.D. 20/20; O.S. 20/50-1. There were also bilateral posterior capsular cataracts, larger in the left eye. Weak lenses were ordered but they did not improve the vision. The fundi were normal. On May 9, 1939, the patient complained of more loss of vision. Examination revealed numerous vitreous floaters in both eyes, also a retinal detachment in the right eye, lower temporal quadrant. This was operated on with immediate good results by Dr. Swigert.

After the first operation there developed what was thought to be a secondary detachment. This was not at the periphery, which seemed healed, but near the center of the original separation. A guarded prognosis was given. A second

operation was performed by Dr. Swigert, with good results and no complications.

Early in 1942, the patient went to the Mayo Clinic for his eczema. A diagnosis of atopic dermatitis was made.

On October 5, 1942, examination revealed a mature cataract in the right eye. This was operated on by Dr. William M. Bane with excellent result. Vision with correction at this time was O.D. 5/20-1; O.S. 5/20-1.

ENDOPHTHALMITIS SECONDARY TO TRAUMA, WITH RECOVERY

DR. RALPH W. DANIELSON presented a 13-year-old boy, who was first seen for refraction in March, 1941, at which time it was found that he was practically emmetropic, each eye, with a vision of 20/15.

He was next seen on June 25, 1942, because on the day before he had been struck in the right eye with a piece of wood.

On examination, it was found that a flat, more or less oblong, sliver of wood was extending through almost the entire thickness of the cornea in a slanting manner. This was removed with considerable difficulty, the attempt being made to avoid pushing the piece of wood into the anterior chamber and injuring the lens. The patient was placed on sulfathiazole, about 0.5 grain per pound of body weight, but in a couple of days it was noted that the cornea was definitely becoming opaque and a hypopyon was developing in the anterior chamber. The sulfathiazole was increased to 0.75 grain per pound of body weight, but, in spite of this, by June 29th, there appeared to be a hopeless endophthalmitis, the cornea showing an increase in opacity and the anterior chamber being so full of hypopyon that the iris could not be seen. It was felt that something drastic would have to be attempted. The sulfathiazole was, therefore, increased to

1 grain per pound of body weight; and a very extensive Saemisch incision was made at the pupillary border, which drained the anterior chamber completely.

This wound was re-opened twice a day for the following week and once a day for several days more.

On July 3d the patient's temperature rose to 103°F., and it was necessary to stop the sulfathiazole. The use of typhoid paratyphoid vaccine was substituted. The eye gradually cleared, leaving an intra-stromal abscess which was opened from the exterior on August 1st and again on August 3, 1942.

On July 24th, the administration of riboflavin, 2 mg., three times a day, was begun. The uncorrected vision at the present time is 20/65, and with a minus 2.50D. sph. \approx +3.50D. cyl. ax. 103°, the vision is 20/15.

This case is presented primarily to demonstrate an eye which, although apparently hopelessly lost, was saved by a combination of sulfathiazole and wide incision of the cornea; (2), the use of riboflavin to increase corneal nutrition; and (3), the remarkable amount of vision now obtained.

Discussion. Dr. Neepser thought phemerol would have been a great help in the early stages of this case. He reported very good results with its use.

SUCCESSFUL RETINAL-DETACHMENT OPERATION IN APHAKIA

DR. RALPH DANIELSON and DR. JOHN LONG presented the case of I. G., a 65-year-old white woman who had had an intracapsular cataract extraction on the left eye in November, 1940. The operation at that time was uneventful and no vitreous was lost. The corrected vision following cataract extraction was 20/20.

On May 21, 1942, a large bullous detachment of the retina, left eye, occurred, and a tear was found in the upper tem-

poral quadrant. This was treated with multiple diathermy punctures. Healing has been satisfactory, the retina having gone back into place; at the present time the corrected vision of the eye is 20/33. The margins of the old tear and the surrounding area of choroidal scarring are plainly seen.

DERMOID CYST OF THE BROW

DR. JOHN LONG presented the case of B. M., a 13-year-old Spanish-American girl. The patient had had a gradually increasing swelling of the lateral angle of the left brow since birth. On November 10th, a cyst, measuring 1.5 cm. in diameter, was excised. This cyst was found to be beneath the orbicularis muscle and not attached to the bone. On opening the cyst, it was seen to contain sebaceous material and numerous tiny hairs. A diagnosis of dermoid cyst was made.

The origin of dermoid cysts was discussed at some length and the theory of Collins and Mayou was mentioned. According to this theory, a dermoid cyst is an inclusion resulting from adhesions between the skin and the suture lines of the skull in early fetal life.

Photographs of the patient and gross and microscopic photographs of the tumor were shown.

FOSTER KENNEDY SYNDROME

DR. W. A. OHMART presented the case of Mrs. D. W. H., aged 28 years, who came to the office on October 22, 1936, complaining of blurred vision. Examination showed an optic atrophy of the left eye. The right eye was apparently normal. Visual acuity at the time was O.D. 20/25; O.S. nil. No lens was of help. The patient stated that Dr. Rudolph Jaeger had operated on her about six years previously for a brain lesion.

In July, 1942, she was again exam-

ined, and a typical Foster Kennedy syndrome was found. A papilledema of about 2 mm. of the disc of the right eye was found. The optic disc of the left eye was atrophic.

She was operated on again by Dr. Rudolph Jaeger.

She again was examined in November, 1942. A peculiar macular lesion was found in the right eye. Optic atrophy was present in the right eye.

For all practical purposes the patient is blind.

Discussion. Dr. Rudolph Jaeger discussed the surgical aspects of the case. Both operations showed the carotid arteries compressing the nerve. Removal of the roof of the optic canal allowed the nerve to be pushed up without pinching against bone.

No enlargement of the pituitary was found at operation.

Dr. W. H. Crisp thought the macular involvement was a capillary breakdown.

Walter A. Ohmart,
Secretary.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

December 8, 1942

DR. D. H. ANTHONY, *presiding*

CONSTANT OCCLUSION IN AMBLYOPIA

DR. E. C. ELLETT reported three cases to illustrate the value of occlusion in the relief of amblyopia. Only constant occlusion was of any value. Anything less was waste of time. The surgical, refractive, and other features of these cases were omitted; they were reported as a few of a good many cases in which the vision was improved by the forced use of the amblyopic eye.

The first patient was L. H., aged six

years, who was seen in April, 1942, with a periodic squint, both eyes turning in under cover, and with an esophoria of 8 degrees. The motion in was stopped by 25-degree prism, base out. Vision in the right eye was 6/15 and J4, and in the left eye 6/6 and J1. On August 4th constant occlusion of the left eye was begun. On October 23d the vision in the right eye had improved to 6/6 slowly, and on November 7th it was 6/6 and J1.

The second patient was A. C., a five-year-old girl, who seen in July, 1942. She had a paresis of the right third nerve, manifested by right hypertropia, ptosis, and a dilated pupil. The vision in the right eye was normal. The vision in the left eye was 6/60. Under constant occlusion of the right eye the vision in the left eye improved to 15/30 in three months, and in five months the vision was 6/6.

The third patient, B. L., a two-year-old boy, was seen in 1938, with convergence of the left eye amounting to 28 degrees. It was not possible to test the vision until a year later, when it was found to be 1/60 in the right eye, and 6/10 in the left eye. Constant occlusion of the left eye was begun in October, 1939, and in January, 1942, the squint was found to be alternating, after which the eyes were occluded alternately. In November, 1942, vision was 6/12 in each eye.

SPASM OF THE CENTRAL RETINAL ARTERY

DR. E. C. ELLETT presented the case of P. R., aged 61 years, who stated that his vision began to fail in April, 1942, the left eye being affected and only at times. The vision was about 5/60 in each eye with glasses. The blood pressure was 126/80. He had had some bad teeth removed and the physical examination otherwise was negative. On the morning he was seen, August 5th, he had four

spells of blurring of vision. He was seen during one of them. Some of the retinal arteries were entirely empty of blood, some showed a broken column. While the eyeground was under observation, the arteries began to fill from the disc end and were soon normal. The time was too short to permit testing the vision and field while the spasms were present, and it was too interesting and unusual a sight to miss the chance to watch it. In September, and again in December, 1942, he reported no further attacks and he has resumed his work as a railroad engineer.

LENS EXTRACTION IN HIGH MYOPIA

DR. E. C. ELLETT reported the case of N. J., a 58-year-old man, who had been under observation for 33 years. He had worn glasses for 15 years prior to his first visit, and his vision was 20/40 in each eye with $-13.00D.$ sph. He gradually developed some myopic changes and a few vitreous opacities, and the vision became worse. In 1937, visible lens changes were noted and they gradually progressed. In July the vision in the right eye was 6/60 with $-18.00D.$ sph. and in the left eye 6/18 with $-11.00D.$ sph. $\ominus -5.00D.$ cyl. ax. 30° . In October, a preliminary iridectomy was done in the right eye, and, in November, an intracapsular cataract extraction. He had a slight anterior-chamber hemorrhage on the sixth day but this disappeared in 24 hours. His vision in the right eye was 6/9 with $+2.00D.$ sph.; with $+2.50D.$ sph. added he could read J2. He was greatly pleased with the new lighter glasses, and with the improved vision.

CONGENITAL PTOSIS

DR. RALPH O. RYCHENER reported the case of P. W., aged nine years, who had had a modified Mottais operation performed on the right eye two months previously with resultant overcorrection,

followed by diplopia, lacrimation, and exposure of the cornea, due to incomplete closure of the lids. On September 9, 1942, with the aid of Dr. P. M. Lewis, the tissues of the upper fornix were taken down, the tongue of the superior-rectus muscle isolated and reattached to the insertion of the ocular muscle, and the levator palpebrae muscle was resected for 4 mm. and the stump sutured to the tarsus. Slides were exhibited of the various preoperative stages along with the final result, which was perfect.

RECESSION FOR HYPERPHORIA

DR. RALPH O. RYCHENER reported the case of R. F., an 18-year-old boy, who was rejected by the Navy because, as the examiner expressed it, "his eyes didn't look right" although his visual acuity was normal. There was a left hyperphoria of 28 degrees due to a paresis of the right inferior-oblique muscle. On July 15th, a 5-mm. recession of the left superior rectus was done, with excellent cosmetic result although on September 8th there was still a demonstrable left hyperphoria of 15 degrees. He was accepted by the Navy on September 10th. Slides were exhibited.

LACERATION OF CORNEA AND SCLERA

DR. RALPH O. RYCHENER reported the case of D. A. C., aged 37 years, who was injured two weeks previously when a soft-drink bottle had exploded in his hand, cutting the right upper lid and lacerating the cornea and sclera. The lid was well repaired but there was a 15-mm. laceration of the cornea at the 9-o'clock position extending up and nasally into the sclera, with prolapse of the iris and ciliary body and marked ciliary injection. Visual acuity seemed fair, and it was determined to apply pure trichloroacetic acid to the wound in the hope that a resistant eschar would be formed. After

two weeks the wound was flat and required no further treatment. On December 4, 1942, the visual acuity was 6/60 but was improved to 6/7.5 and J2 with +4.50D. sph. \Rightarrow -13.00D. cyl. axis 100°. A slide was shown.

SYMMETRICAL MUSCLE PARALYSIS IN IDENTICAL TWINS

DR. RALPH O. RYCHENER reported, with color slides, the cases of S. O. and L. O., four-year-old identical twins, whose mother had noticed that one eye failed to move upward in certain positions. In the one this proved to be due to a paralysis or absence of the right inferior oblique; in the other to a similar condition of the left inferior oblique. Binocular vision with the Worth dot test without demonstrable diplopia was present in the primary position. No treatment was advised.

MYASTHENIA GRAVIS

DR. J. WESLEY MCKINNEY presented a case report of W. S., a 65-year-old man, who was first seen in June, 1940. On the first visit the left upper lid began to droop and in about one month the right upper lid also began to droop. At this time there was also weakness of the jaw so that he had to hold the jaw to be able to chew. There was a paralytic ptosis of the upper lid of each eye varying in degree at different times of observation. All the muscles of the face seemed to sag. The jaw jerk was absent. The ocular rotations were normal and there was no diplopia.

The patient had pernicious anemia and it was thought at first that this was the cause of the ptosis. At one of his visits to the office he was given prostigmine methyl sulphate by hypodermic injection. Within 15 minutes the ptosis had disappeared and the facial expression became normal. His condition varied con-

siderably over the next year and a half but for the most part he had been able to control the ptosis and weakness of the facial muscles with prostigmine by mouth. There has been no spread of the weakness to other muscles.

On one occasion he came in for refraction at a time when the lids were drooping so much that most if not all of the pupil in each eye was covered. After the injection of prostigmine the lids became normal and refraction was carried out without difficulty.

ARGYLL ROBERTSON PUPIL, CONGENITAL

DR. J. WESLEY MCKINNEY reported the case of H. S., a 46-year-old man who was seeking relief from presbyopic symptoms. When it was found that his pupils were very small the patient said that they had always been small. He had had thorough physical examinations on various occasions; these were always negative. The eyes were entirely normal except for the fact that the pupils measured less than 1 mm. in diameter in each eye. They were equal in size but did not react to a strong light, but reacted promptly to convergence. The pupils dilated to 3 mm. in each eye a short time after the instillation of paredrine. This eliminated a parasympathetic paralysis as the mechanism of the condition. The patient refused spinal puncture.

SUCCESSFUL RESULT IN OLD RETINAL DETACHMENT

DR. DEXTER J. CLOUGH, II (by invitation) presented the case report of a 10-year-old boy, who was found to have greatly reduced vision in his left eye when examined by school authorities. The boy and his family were previously unaware of this visual defect. A history of trauma at the age of three years, when the child sustained a fractured nose, was elicited.

Vision in the left eye was limited to perception of hand movements at 3 feet. Ophthalmoscopic examination revealed an almost total detachment of the retina with a massive bulging inward from both the temporal and nasal sides. The patient was hospitalized, and after two days of absolute bed rest in the supine position and fixation of the eyes during the waking hours by appliance of pin-point disc spectacles, there was enough regression of the retinal elevation to reveal a small retinal tear in the upper nasal sector just anterior to the equator.

Diathermy operation for the retinal detachment was carried out, with the use of both the Weve surface-diathermy technique and the Walker micropin technique, about the site of the retinal tear localized on the sclera and over the upper hemisphere of the globe between the ora serrata and equator. Subretinal fluid was released through two trephine holes, one over the upper nasal sector and one over the upper temporal sector to correspond to the nasal and temporal bulging of the retina. Postoperatively the retina was found to have completely reattached, and the vision in this eye a month later was 6/24+ with a full field.

It was not known definitely whether the detachment had existed for seven years, that is, from the time of the nose fracture, but it is probable that it had existed for a considerable time. In view of such an unfavorable prognosis, the good result would encourage the operative interference of any retinal detachment regardless of its duration.

GLAUCOMA SECONDARY TO DISCISSION

DR. J. WESLEY MCKINNEY reported the case of F. C., a 56-year-old man, who had had a successful intracapsular cataract extraction in the right eye. When the left eye was operated on, it was found that the capsule was too tight

to be grasped with forceps, which fact necessitated an extracapsular extraction. A moderate amount of cortex was absorbed rapidly, leaving a fairly dense secondary membrane.

The patient returned for discussion two months after the operation. By mistake atropine was instilled preoperatively instead of homatropine, giving very wide dilatation of the pupil. The membrane was needled and a large pupillary opening was obtained.

Two hours after the operation the patient complained of pain which became increasingly severe. The eye became stony hard. For three days the pain was intense; the pupil remained dilated, and tension remained high despite the use of eserine, mecholyl, prostigmine, and heat. The pupil began to constrict on the morning of the fourth day and the tension was less. By afternoon the tension was normal. The tension has remained normal for two years, without the use of miotics, and vision was corrected to 20/15.

GUNSHOT WOUND OF THE EYE AND BRAIN

DR. PHIL LEWIS reported the case of H. S., a colored man, aged 28 years, who was admitted to the eye service of John Gaston Hospital on July 5, 1942, because of a gunshot wound of the left eye. He gave a history that a shot gun was fired at him at the distance of about one-half block. Several shot hit him but only one above his shoulders. He entered the Hospital two hours later complaining of pain in the back of his head and loss of vision of his right eye.

Examination on the following day showed that a shot had perforated the center of the lower right eyelid about 3 mm. from the border. There was a round hole in the sclera about 4 mm. from the limbus in the 5-o'clock meridian. The anterior segment of the eye

was normal except for a dilated pupil which did not react to light. The vitreous was full of blood so that the fundus could not be seen. There was no perception of light. X-ray studies were made to determine the position of the shot. Much to our amazement it was found to be in the lower occipital region and all the ventricles of the brain were filled with air.

Two days later the patient's temperature had risen to 100°F., and he complained more of headache. Further X-ray studies showed the amount of air to be about the same. The optic foramen was normal. No fractures of any part of the skull or sinuses were found. The following day, because his neck was stiff, a spinal puncture was ordered and consultation was requested with the neurosurgical department. Sulfapyridine was given in the amount of 90 grains a day. The patient's temperature rose to 104°F. He became delirious and the interne was unable to do a satisfactory lumbar puncture. The patient was quite ill for about four days and then began to recover rapidly. An X-ray examination of the skull on July 25th showed that the air had been absorbed. He was discharged from the Hospital in good condition except for the loss of vision in the right eye. The blood in the vitreous had absorbed sufficiently to allow the examiner to see that the retina was detached. The eye was totally blind.

The patient was not seen again for almost two months. He then came in with his eye severely inflamed and very painful. Examination showed an iridocyclitis, fresh blood in the anterior chamber, and secondary glaucoma. Enucleation with glass-ball implantation was performed and was followed by an uneventful recovery.

Abstract from the report of the Army Medical Museum was as follows: Scleral

scars at the points of entrance and exit of shot, dislocation and cataract of lens, recent and old organizing hemorrhages, detachment of the retina, which was drawn over toward the scleral scars.

Comment. It is obvious that the bullet must have traversed the eyeball and orbital tissues and passed through the supraorbital fissure. That it did so without injury to the various important structures in this area is remarkable. Even more remarkable is the fact that it caused the ventricles to become filled with air. Just how this occurred is not clear. Probably a posterior ethmoid cell or the sphenoid was opened and the air came from that source. Certainly the ventricles were pierced in some portion. Complete recovery occurred except for the loss of the injured eye.

SEVERE PROCAINE REACTION

DR. PHIL LEWIS reported a case of near fatality presumably from injection of procaine hydrochloride for a minor plastic operation on the eyelids.

Mr. J. D. R., a white man, aged 73 years, was admitted to the John Gaston Hospital on September 18, 1941. He had an old inactive trachoma with a moderate entropion of the lower eyelids. Considerable corneal irritation was present due to trichiasis. Plastic surgery on the lids was to be done first, and extraction of senile cataracts at some later date was contemplated. Routine physical examination was negative. The man was apparently in excellent general condition.

On the morning of September 19th, he was given 3 gr. of nembutal at 7:15 a.m. At 8 a.m. 4-percent cocaine hydrochloride and epinephrine 1:1,000 were dropped into each eye several times (6 drops of cocaine and 3 of epinephrine in each eye). At 8:15 a.m. both lower lids were infiltrated and the sensory nerves blocked by injections of 1-percent pro-

caine hydrochloride with one drop of 1:1,000 epinephrine per cubic centimeter. A total of seven cubic centimeters of procaine was used. An incision splitting the right lower eyelid was begun. Immediately the operation had to be discontinued due to a sudden, alarming change in the patient's condition. He took a few deep, rapid breaths, became extremely cyanotic and stopped breathing. The heart ceased beating. Artificial respiration by rhythmical pressure and relaxation of the chest was started while hypodermic injections were being quickly prepared. Coramine (1 c.c.) was injected into the external jugular vein. Epinephrine hydrochloride 1:1,000 (1 c.c.) was injected directly into the heart. An Emerson Resuscitator, which pumped oxygen rhythmically into the lungs was employed. After 10 minutes had elapsed, during which time there was no sound of cardiac action and he was apparently

dead, his heart began to beat very feebly. From then on his improvement was steady and after 30 minutes more he was returned to bed with instructions for very careful watching. After two days he left the Hospital in good condition. The operation was not performed.

Comment. In the opinion of all who witnessed this near fatality it resulted from procaine sensitivity. It was true that some cocaine was used but the amount was very small and he showed no symptoms until after the procaine injections. Cocaine had been previously used in his eyes without mishap. This man was clinically dead for 10 minutes and his recovery or resurrection was due to the most efficient services rendered by the Hospital staff. The Emerson Resuscitator certainly played an important part in saving this man's life and was therefore recommended as standard equipment in all hospitals.

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THE WAGNER BILL

In the medical profession there are not many minority opinions with regard to the Wagner Bill. The profession as a whole has turned its face against any form of the socialization of medicine. We are all thoroughly convinced that the highest types of medical practice are carried on in the very personal relationship of private physician to his patient. It is therefore argued that anything which destroys this relationship must be bad in its very essence.

The writer is not aware that anywhere in the medical periodical literature of this

country has anything been said even mildly favorable to the Wagner Bill. Yet there is some reason to believe that the Bill voices the purposes of one much higher in authority and influence than Mr. Robert F. Wagner, the Senator from New York. Many of us are convinced that the Bill in its present form cannot pass through Congress. But there are others who believe that, with the very influential backing of the highest in the land in alliance with the trade unions, the Bill may have a good chance for becoming law.

It is not expected that anything here said will play an important part in either

passing or defeating the Bill. Yet if there exist in the medical profession and among our own good friends any substantial differences of opinion as to the Wagner Bill we ought to know everything possible about such points of view.

Let us, for the moment, ignore any vote-catching problems involved, even among Senators and Congressmen, and consider only principles and practical consequences. As bearing upon the attitude of the medical profession, the only carefully prepared documents with which most of us are familiar as dealing with the Bill are severely and even utterly condemnatory. Chief of these is the report of the National Physicians' Committee, an organization financially independent although apparently owing its inception to the American Medical Association, and receiving support from some of the large drug manufacturers. A short summary of the medical provisions of the Bill has also been issued by the American Medical Association's Council on Medical Service and Public Relations.

Only one other organization within the medical profession appears to have made a careful attempt to analyze the provisions of the Wagner Bill. This is the numerically small but professionally rather significant group known as the Committee of Physicians for the Improvement of Medical Care, Inc., whose Secretary is John P. Peters, M.D., of New Haven, Connecticut. It may be recalled that this organization came into existence six or seven years before the organization of the "National Physicians' Committee," with its rather imitative title.

Perhaps the most striking feature of the Wagner Bill is its breath-taking comprehensiveness. It would undertake provision of medical care for a total number of persons estimated at from 100 to 110 million. The item of finance is mentally overwhelming. The Bill as a whole (with

its increase probably from 37 to 62 million in the number of persons registered under the Social Security laws) might involve the collection of the staggering total of 12 billion dollars from employers, employed, and self-employed. (The average annual revenue of the United States Government from all sources during the ten years 1924 to 1933 inclusive was $3\frac{1}{2}$ billion.)

Something like absolute authority under the law would be placed in the hands of the Surgeon General of the United States Public Health Service, although with aid from advisory councils (Social Security Council, and Medical and Hospital Council) which would have important functions with regard to organization and administration. The Surgeon General would apparently have power to establish rates of payment for medical services, to decide to whom physicians might provide services, to approve or disapprove hospitals and clinics, to publish lists of physicians entitled to render services under the law, and to establish qualifications for specialists.

The A.M.A.-sponsored committee (National Physicians' Committee) declares that, if enacted into law, the provisions of the Wagner Bill would "destroy the private practice of medicine in the United States"; that "State Medicine means abject slavery"; and that for the mass of people it involves "medical care through and by physicians who are politically amenable rather than by those with superior abilities and skills," as contrasted with "the practice of medicine under the Christian concept of the sanctity of human personality."

The Committee of Physicians for the Improvement of Medical Care is also strongly critical of the Wagner Bill, although this Committee, we are reminded, has already recorded its approval of a national health program. The Committee

does, however, offer constructive comment as to the faults of the Wagner Bill as applied to such a health program. Perhaps the most vital criticism of the Bill, as presented by this Committee, relates to the enormity of the program, the attempt to conjure such a plan out of thin air, lacking the benefits that might be derived from a slower and more evolutionary procedure, with its gradual accumulation of experience and the step-by-step adjustments rendered possible by trial and error and correction. "In an experiment of such vast proportions as that contemplated by the Bill it would seem wiser and more conducive to the improvement of medical care to cover at the start a smaller proportion of the population."

We are reminded that a bill introduced by Senator Wagner in 1939 proposed a national health program financed by grants-in-aid to states complying with the standards of the Federal Government. Such grant-in-aid would have permitted gradual development and local autonomy under Federal supervision.

It is further suggested that a tax-supported system might be more equitable and economical. Such a system would make it possible to provide care at first for those who were most truly in need, leaving room for such further expansion as experience and expediency might indicate.

Much has been said for and against the principles of States' rights as contrasted with Federal control, in relation to many lines of activity. The adoption of legislative innovations for relatively small units of the population has at least the virtue of limiting the mistakes that may arise in new experiments, and of permitting valuable lessons to be learned as to the manner of carrying out novel ideas. But Senator Wagner, and those associated with him in the present proposals for sweeping social change, appear to have thrown

overboard the spirit of caution embodied in their earlier plan. The Committee of Physicians for the Improvement of Medical Care suggests that the scope of the new proposals might well at first be limited to a lower income, say \$2,000 or \$2,500, as compared with the \$3,000 limit provided in the Bill.

The present Bill's provision that hospital service shall be of the type offered by "ward or other least expensive facilities compatible with the proper care of the patient" seems to suggest that those who have been accustomed to purchasing semi-private or private accommodations in hospitals, or to consulting physicians who have comfortable waiting rooms and well-furnished offices, will have to forego the benefits provided under the Bill unless they are willing to accept services of the sort furnished in a ward or dispensary. Or are such patients to be allowed to spend private funds on these services while economizing on their payments to physicians? The Committee of Physicians for the Improvement of Medical Care suggests that, however handled, this problem opens the way for abuse, whether to the advantage or to the disadvantage of the physician.

There are those who believe that Mr. Wagner's Bill cannot pass into law. Others, including the "National Physicians' Committee," recognize a danger that the Bill may pass in its present form and are determined to do all in their power to prevent such an outcome. In this spirit of opposition and determination they refrain from such constructive criticism as might be supposed to acknowledge the possibility of improving a desperately bad proposal. The Committee of Physicians for the Improvement of Medical Care, on the other hand, acts on the basis that certain parts of the Bill ought to be constructively modified. Particularly this Committee emphasizes the

weakness of the Bill as to provision for group practice in and out of hospitals. "Medicine," says the Committee, "has long since passed the stage in which the individual medical practitioner can provide good medical care as a solitary individual." While the Bill appears to give the Surgeon General the right to contract for group service, the Committee urges (1) that groups of physicians so approved shall be qualified to furnish medical services, (2) that beneficiaries or groups of beneficiaries shall be permitted to select the medical groups from whom they shall receive services, and (3) that approved groups shall have their names published on the lists provided for individual physicians.

As contemplating the event of the passage of the Bill, another constructive criticism is to the effect that the Bill does not fully recognize the proper organization and function of hospitals, and that the proposed rates of payment to hospitals are too small to cover costs of services by laboratory staffs, internes, and residents. Also, "there is no separate provision for the payment of physicians who furnish professional services in the hospital. It seems to be assumed: first that every hospital shall be an 'open' hospital in which each family practitioner cares for his own patients; and second, that laboratory, X ray and consulting services are to be paid for separately." The Committee suggests that "such a system would negate the principle of coöperative group medicine."

The Committee of Physicians for the Improvement of Medical Care offers important suggestions as to the maintenance of outpatient clinics. Since under the proposed law a large proportion of the patients who now attend outpatient clinics would be able to consult their own physicians, these clinics could no longer be

maintained unless organized as centers of group practice under the law. For this purpose the Committee suggests that the Surgeon General should be authorized to make contracts with approved outpatient clinics for certain services and that the remuneration of the physicians should be included in such contracts. The Committee, however, points out that only by means of a well-organized and highly developed outpatient service would it be possible to avoid the wasteful tendency (which has arisen under existing hospital-insurance systems) toward hospitalizing patients for conditions that do not require inpatient facilities.

It appears that first visits are or may be excluded from coverage under the proposed law. This, the Committee of Physicians for the Improvement of Medical Care points out, "violates the principles of preventive medicine," since it acts as a deterrent to the early treatment of disease. It also tends to prolong disability. A proposal to limit laboratory benefits under the Bill is condemned as inimical to the best medical care. These exceptions are intended to prevent abuse of the system, but such an object should be, the Committee suggests, accomplished in other ways.

The same Committee expresses serious concern as to a proposal to recognize under the law a system of "fee-for-service." This practice, the Committee points out, has been found (under insurance systems) to encourage malingering on the part of the patient and unnecessary multiplication of service by the physician. It is stated that British physicians, under the system of National Health Insurance, have expressed their preference for per-capita payments rather than fee-for-service. The latter practice is also ill adapted to preventive medicine.

Personal contact with British physi-

cians seems rather to indicate that the British Panel System is viewed with less disfavor among the general physicians than among specialists. If in the United States there are any appreciably varying degrees of hostility to the proposed extension of socialized medicine, it is to be supposed that here again the degree of hostility will be found greater among specialists than among general practitioners. The practice of specialized medicine may on the whole be assumed to carry certain advantages over the practice of general medicine, as to social and professional status, personal independence, and financial gain.

The subject of specialization, as dealt with in the Wagner Bill, is scarcely mentioned in the report of the National Physicians' Committee. The Committee for the Improvement of Medical Care, however, intimates that the Bill's definition "of specialists and the manner in which they may be employed lacks clarity." The latter Committee objects to the Bill's prescription of "the exclusive utilization of standards and qualifications developed by competent professional agencies" (presumably examining boards). While "the standards and certifications of these agencies could, like any other relevant data, be employed by the Council, . . . their use should not be prescribed in the Bill."

It is noted that in smaller communities some general practitioners will have to perform functions which in larger cities will be conducted by specialists, and that provision must be made for compensating the general practitioner who has acquired proficiency in special fields. It is further objected that, while the Bill provides for consultation with specialists, it does not specifically recognize continuous treatment by specialists. The Bill provides that "the services of specialists shall ordinarily be available only upon the advice

of the general practitioners," but the Committee insists that the patient should be given the greatest possible freedom in the choice of a specialist.

It is to be regretted that such constructive criticism as is afforded by the report of the Committee of Physicians for the Improvement of Medical Care has not found more general access to the profession. There are a number of physicians who agree with the conclusion of the Chicago "Committee on the Cost of Medical Care" that some form of national program for the improvement of medical care is desirable. Many of us now contribute heavily of time and skill, without financial recompense, to various forms of socialized medicine. The profession is also supporting certain schemes for group health insurance. But the more we study the ramifications and complications involved, the more we are led to doubt the wisdom of venturing, without benefit of the lessons to be learned from more partial and gradual change, into the enormous and revolutionary experiment proposed under the Wagner Bill.

W. H. Crisp.

OUR POSTWAR PROBLEM

The ophthalmologic training centers in the United States are facing a real problem in planning how to meet the demands for ophthalmologic education in the immediate postwar period, demands that are even now mounting in an ever-increasing tide. Owing to the curtailment in the resident service by the armed forces and by the procurement agency, there will be a definite gap in the ranks of well-trained younger ophthalmologists, and it will be the duty of the training centers to make that hiatus as small as possible. Consequently, it is the duty, right now, of the

educators to establish plans and means to care for the influx of men that will flood the ophthalmologic training centers, starting with the beginning of demobilization and continuing for at least two or three years.

Apparently, there will be four main classes to be provided for:

A. Recent graduates who have finished their general internship, who may or may not have served in the armed forces, and who wish to specialize in ophthalmology as their life work. This constitutes the group that have in the past composed the regular resident staff and whose training will proceed along established prewar lines.

B. Residents in ophthalmology whose career was interrupted by service with the armed forces before completion of their training.

C. Men who have had from one to two years (or even more) of training in ophthalmology and who, because of absence from that field of work, require a fairly rapid comprehensive refresher course.

D. Practicing ophthalmologists who have been on duty with the armed forces and feel that they require refresher work before returning to civilian practice.

All four of these groups require separate consideration which must be tempered by the realization that the total number will far exceed any aggregation of ophthalmic students in the past. Consequently, plans elaborated by the training centers must take into account the physical limitations of the centers themselves, such as the amount of laboratory and clinical material available for the necessarily individualized instruction that is so essential in ophthalmology.

The regular resident training of group A should proceed as in the prewar period in general. But care must be taken to limit the number of residents to the prewar level, despite the fact that eventually

each institution must increase its quota of residents to provide an adequate supply of ophthalmologists to the country as a whole. However, that increase cannot be made until the immediate postwar training program has been completed.

Group B presents a somewhat more difficult problem. Each institution has the moral obligation to take back into its resident ranks any man whose training at that institution was interrupted for service with the armed forces, and to complete that training, both in time and scope. This will necessitate practically doubling the resident staff without similar increase in physical equipment or clinical material. That will mean that each resident will have direct charge of fewer patients than in the past, but that can be compensated for by insistence upon more thorough and meticulous work in each individual case. That will also mean that each resident will be given somewhat less surgery to perform than in the past, which may not be an unmixed blessing. It will also mean that under closer direction of the educators, each resident will have more study time available and will emerge from the institution with a better knowledge of the basic sciences (particularly pathology) than in the past. These problems are, of course, peculiar to each training center, but with proper advance planning they can be solved for the greater good of ophthalmology.

The next group is numerically rather small, composed of probably not more than 125 to 150 members, and the problems of this group can be solved rather easily by concerted action of the various training centers. There has been circulated among some of the larger centers a plan to establish an intensive three months' course in ophthalmology, somewhat similar to that given in Vienna in the 1920's, and known as the Fuchs course. Such courses, limited to 25 persons, would be

presented at some six or eight of the larger centers where there is adequate teaching personnel. They would start immediately after the cessation of hostilities and be staggered so as to take care of the men as they are demobilized. The course would cover clinical, didactic, and laboratory reviews of the entire subject of ophthalmology. For the more or less individualized clinical instruction, the class would be subdivided into small groups. Needless to say, the course would be open only to men who had completed at least one full year of formalized instruction in ophthalmology and would not constitute a short cut to the practice. In that or some similar way, this comparatively small group of men whose training falls just short of the desired, could be given the necessary instruction that would fit them to start out in civilian practice. For the success of such a plan, coöperation by the Surgeons General of the armed forces is essential, and this has been tentatively promised.

The last group comprises men who have been in the practice of ophthalmology before their entrance into the armed forces and who wish to fill out the gaps in their knowledge. For these, the formal courses that are presented at various centers throughout the country are inadequate. They do not wish to spend two or three weeks listening to lectures on a heterogeneity of subjects without correlation. They need to observe clinical material and receive some didactic instruction in certain subjects in which they feel they are deficient. For them, attendance at an active teaching clinic offers the best solution available at present. Each clinic must be prepared to receive these men on an informal basis and give them the privilege of browsing, for they know what they need.

All this adds up to the fact that ophthalmology has a job to perform in the

near future and the sooner concrete plans are laid, the less confusion there will be when that job plunks itself down into the lap of ophthalmology.

Harry S. Gradle.

THE SHEARD FOUNDATION FOR EDUCATION AND RESEARCH IN VISION

The movement which culminated in the conception of a Foundation for Education and Research in Vision at the Ohio State University had its beginnings with the introduction of the two-years' course in applied optics in the department of physics at the Ohio State University, in 1914. After some years it became obvious that the importance of the work was so great that it warranted four years of training fundamentally devoted to the basic mathematical, physical, and biophysical sciences with their applications in physiological optics, clinical significance, and practical work. It was proposed to set up in the University a department for research in all phases of problems in vision in which there would be postgraduate instruction in the subjects of physiology, physics, ophthalmology, and optometry to students enrolled in the graduate school of the University, with no restrictions other than the necessary educational qualifications.

There were, from the very beginning, *two projects* definitely in mind: (1) The Foundation for Vision, and (2) the School of Optometry. These projects were naturally inclusive in the minds of only those who thought of vision in terms of optometry alone. But in all pamphlets and statements which have been officially issued by the University there has been an attempt, at least, to emphasize the fact that the Foundation is independent of any system of practice and also independent of the School of Optometry, which is a part

of the educational provisions of the University. The Foundation is an undertaking universally applicable to all matters pertaining to vision and has no connections with the School of Optometry other than those which logically arise by reason of the fact that optometry is a subject pertaining to visual science.

It has long been recognized that research in all phases of visual science is proceeding in a number of schools and laboratories with results that justify continuation of the work. The objectives of the studies may be clinical, psychological, physiological, economic, sociological, or commercial. Whatever of good results from these bits of isolated researches should be panned and preserved for application where they can best be employed. A central processing and proving station is required to evaluate the results of such studies as are carried on there and elsewhere, and it is just that purpose that is to be served by the Sheard Foundation. In order that there may be adequately trained teachers in the things of vision, whether they go as teachers or research workers into ophthalmology, optometry, illuminating engineering, visual direction in industry, physico-physiology, psychology, or some other branch of learning, there must be some center possessed of adequate medical and other collegiate departments and a conviction about and interest in matters of vision.

The purposes of the Foundation are:

1. To stimulate research in every way possible insofar as visual problems are concerned, and to give attention in these researches to both matters of theory and of practice.

2. To exercise a leadership in all matters concerning vision of an educational or research character to the end that the Foundation in Vision may contribute the greatest good to the greatest number possible.

3. To provide facilities and contacts with various departments and schools of the University, and to attract outstanding men in some manner interested in vision to spend a sabbatical year or other period of time in study and research.

4. To develop training for those who are concerned in any wise with vision. This, for example, might consist of a single course for illuminating engineers or safety engineers, a course in physiological optics for psychologists, or for optometrists or ophthalmologists.

5. To train those who are to become the teachers and research workers of the future in the fields of ophthalmology, optometry, specialists in industrial visual problems and to carry a limited number of postgraduate students through thesis requirements and to a doctorate degree.

The Foundation will operate under the supervision of a board of directors composed of outstanding men in the fields of education, medicine, industry, and applied optics. The faculty will consist of a number of full-time teachers and investigators, selected lecturers from related schools, and artisans skilled in optical construction. Instruction and research work will be carried on in such subjects as myopia, color vision, dark adaptation, visual standards, accommodation, eye movements, refraction, reading difficulties, orthoptic training, and visual rehabilitation.

The purposes of the Foundation are laudable and the character of its formation and sponsorship unimpeachable. With a competent staff and adequate financial and moral support from medical as well as lay sources it promises to fill the needs so sorely felt at the present time by all groups of professional men who are endeavoring in their own way to relieve distress of sufferers of visual disturbance or to aid by scientific research and application the lessons learned by researches

in applied optics. The Foundation deserves the moral and financial support of the medical profession.

W. L. Benedict.

BOOK NOTICE

THE READABILITY OF CERTAIN TYPE SIZES AND FORMS IN SIGHT-SAVING CLASSES. By Harold J. McNally, Ph.D. Clothbound, 71 pages. Bureau of Publications, Teachers' College, Columbia University. 1943. Price \$1.75.

An estimate of one child in 500 or over 50,000 of the children in this country are partially sighted and require special educational facilities. Many of these children are in sight-saving classes, of which there are 635. These classes represent 227 cities and 31 states. In New York City there are 88 schools with sight-saving classes, enrolling approximately 2,000 pupils. The education of this large a number of children is a sizable and important undertaking. The author of this book has attempted to determine experimentally the best materials for use in these classes.

Reading tests were made on a large group of partially sighted students, using a variety of types. The reading period and light intensity were controlled. Reading speed and eye-blink frequencies were determined.

The results of the study did not permit the conclusion that any one of the experimental types was preferable to any of the others for use in the sight-saving classes.

H. R. Hildreth.

CORRESPONDENCE

AN ERRATUM AND FOLLOW-UP NOTE

February 24, 1944

Editor, American Journal of Ophthalmology

In reference to an article entitled "Post operative endogenous infection," which I wrote in collaboration with Dr. Daniel Kravitz, on page 170, paragraph 3 (Feb., 1944 issue) it is stated that the patient's vision is 20/10+. This is an error. Vision at the time of writing the paper was but 20/100+, and final vision, about three months later, was 20/50+.

(Signed) Lloyd J. Duest, M.D.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

- | | |
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| 1. General methods of diagnosis | 10. Retina and vitreous |
| 2. Therapeutics and operations | 11. Optic nerve and toxic amblyopias |
| 3. Physiologic optics, refraction, and color vision | 12. Visual tracts and centers |
| 4. Ocular movements | 13. Eyeball and orbit |
| 5. Conjunctiva | 14. Eyelids and lacrimal apparatus |
| 6. Cornea and sclera | 15. Tumors |
| 7. Uveal tract, sympathetic disease, and aqueous humor | 16. Injuries |
| 8. Glaucoma and ocular tension | 17. Systemic diseases and parasites |
| 9. Crystalline lens | 18. Hygiene, sociology, education, and history |
| | 19. Anatomy, embryology, and comparative ophthalmology |

4

OCULAR MOVEMENTS

Verhoeff, F. H. **Recurring attacks of concomitant exotropia each followed by transient esotropia.** *Arch. of Ophth.*, 1943, v. 30, Dec., pp. 727-731.

The patient, a Jewish female, first noticed disturbances of the ocular muscles seven years ago at the age of 28 years. Since that time she has had approximately 24 similar attacks. Typically the muscle disturbance has consisted of a severe nonparetic exotropia or exophoria, followed by a transient esotropia. The exophoric and the esophoric phase of an attack each has lasted about one week. At the onset of each attack the patient has had severe headache, nausea, and other symptoms. The entire disturbance is attributed to migraine. Hysteria and other disease factors have been excluded. The possible mechanism of the oculomotor disturbance is discussed in some detail. The phenomena seem best to be explained by the assumption that a vasomotor disturbance associated with migraine first depressed and then temporarily raised the tonus of Perlia's nucleus.

John C. Long.

5

CONJUNCTIVA

Allen, T. D. **Epidemic keratoconjunctivitis from a subjective viewpoint.** *Amer. Jour. Ophth.*, 1944, v. 27, Jan., pp. 16-18; also *Trans. Amer. Ophth. Soc.*, 1943, v. 41.

Paradoksov, L. F. **Streptocide in the therapy of trachoma.** *Viestnik Oft.*, 1943, v. 22, pt. 2, pp. 41-46.

A review of the literature and a report of the author's clinical investigations on 150 cases, five of which are reported in detail. The treatment consists in the internal administration of 0.3 gr. five times daily for ten days, and a repetition of the ten-day course of treatment two to five times, with a five-day interval between courses. Streptocide powder was used locally following expression. The conclusions are that streptocide is an effective agent in the therapy of trachoma; that it is possible to cure suitable cases of trachoma with this agent alone; that better results are obtained by combination of mechanotherapy, in the form of expression and massage, with interrupted courses of streptocide; that

streptocide rapidly reduces the acute inflammatory phenomena in the cornea and conjunctiva, and that streptocide powder used locally gives very encouraging results, being especially effective in pannus and corneal ulcers. (2 tables.)

Ray K. Daily.

Pletnieva, H. A. **Oculoglandular tularemia.** *Viestnik Oft.*, 1943, v. 22, pt. 1, pp. 11-16.

Tularemia becomes an important infection in wartime. While its mortality is low, it rapidly assumes epidemic proportions, and, lasting for months, it causes prolonged periods of disability. The infection may come from hides of infected animals, or from bites and the blood of vermin, flies, mosquitoes, fleas, and mice. The infection may be carried by birds, cats, dogs, horses, or cattle. Infected water-supply and delayed milling of grain are factors in spreading the infection. The possibility of infection from one person to another is still a matter of dispute, but Mitzkevich is said to have produced oculoglandular tularemia in a patient by inoculation of secretion from a papule of a patient with the disease. The author proposes that, in view of our present knowledge of this infection, the term Parinaud's conjunctivitis shall be limited to oculoglandular tularemia, and shall not include cases caused by syphilis or tuberculosis.

Some ophthalmologists regard Parinaud's conjunctivitis as a clinical symptom-complex the etiology of which may vary. Pletnieva believes that with the present laboratory facilities Parinaud's conjunctivitis should be considered synonymous with tularemia. The two important diagnostic tests are the agglutination reaction and the skin test for tularemia. Four cases of oculoglandular tularemia are reported, in

two of which the erroneous diagnosis of dacryocystitis was made, because of the presence of a papule in the region of the lacrimal sac, with a necrotic center. The treatment is symptomatic. Convalescent serum is very effective and is indicated especially in the oculoglandular form to hasten resolution of the conjuncival process.

Ray K. Daily.

Shane, S. J. **Oropharyngeal ulceration with conjunctivitis and skin lesions.** *Canadian Med. Assoc. Jour.*, 1943, v. 49, Oct., pp. 309-311.

Four cases characterized by severe conjunctivitis, marked ulceromembranous stomatitis, obscure skin lesions, and generalized toxemia, with marked prostration, are described in detail. In the author's patient, the condition became much worse after sulfonamide therapy and was at first ascribed to that therapy. The eyelids were swollen and there was a thin seropurulent conjunctivitis from which the only smear apparently taken was one in which a gram-positive diplococcus was found. Smears from the mouth contained *Borrelia vincenti* and other organisms which were apparently incidental. The possibility of a primary virus infection seems not to have been considered.

Charles A. Bahn.

Williams, H. C. M. **Cutaneous and conjunctival diphtheria.** *Brit. Med. Jour.*, 1943, Oct. 2, pp. 416-417.

During the eight months prior to April, 1943, there were admitted to the Isolation Hospital, Southampton, from a military hospital, 19 patients who had lesions of the skin or eyes from which the diphtheria organism had been isolated. Of these, 12 were infected with virulent and 4 with avirulent organisms; in the remaining cases tests for

virulence were not carried out. Brief summaries of the 19 cases are given.

No toxemias could be ascribed to the action of diphtheria bacilli in any of these cases. No paralysis ensued. Membranes were seen in three cases of cutaneous infection and in one of conjunctival infection. In all the other cases the lesions had the usual characteristics of the skin condition as originally or subsequently diagnosed. The recognition of cutaneous diphtheria among patients with a variety of skin infections suggests the need for more frequent bacteriologic investigation in such cases.

Charles A. Bahn.

6

CORNEA AND SCLERA

Allen, T. D. **Epidemic keratoconjunctivitis from a subjective viewpoint.** Amer. Jour. Ophth., 1944, v. 27, Jan., pp. 16-18; also Trans. Amer. Ophth. Soc., 1943, v. 41.

Goldenberg, A. Z. **The use of albucide in the therapy of serpiginous and purulent corneal ulcers.** Viestnik Oft., 1943, v. 23, pt. 1, pp. 34-38.

This is a report of a clinical investigation on the use, in corneal lesions, of sodium acetyl sulfanilamide, a water-soluble sulfa preparation manufactured in the U.S.S.R. Of 90 patients treated, 66 had deep purulent corneal ulcers and nine had total corneal involvement. In 64 the ulcer was central, and in 17 peripheral. Eight cases had corneal perforation on admission, and seven a descemetocoele. Bacteriologic studies were made in 65 cases, and the pneumococcus was found in 86 percent. The method of treatment finally arrived at consists of blowing the powdered drug on to the cornea every three hours day and night for the first day, and only during waking hours after the first day.

The only other drug used in these cases was atropine or eserine, as indicated. The tabulated data show that in 60 patients the ulcer was clean and completely covered with epithelium in ten days; and in 39 of these in five days. In 14 cases the ulcer was covered with epithelium in 10 to 15 days. Healing was accompanied by formation of a firm flat cicatrix, restoration of the anterior chamber without the development of corneal staphyloma, absorption of corneal infiltrates, and early abundant vascularization around the ulcer. The advancing edges of serpiginous ulcers were arrested on the second day, and hypopyon was absorbed in from 1 to 4 days in 18 of 24 patients. In 9 out of 71 cases vision was the same as on admission, and in 62 it was better than on admission. The average hospitalization time was 19 days but patients with total corneal involvement stayed in the hospital an average of 35 days. Iritis, marked hyperemia, rigidity of the iris, and a tendency to synechia delayed recovery in spite of the favorable process in the corneal lesion. It appears therefore that albucide does not influence the process in the iris as it does in the cornea. The author also notes that local application of this drug does not prevent penetration of the infecting agent into the deep ocular tissues.

Ray K. Daily.

Kalfa, S. F. **Ether in the treatment of corneal diseases.** Viestnik Oft., 1943, v. 22, pt. 2, pp. 23-25.

This is a tabulated report of 25 cases of keratitis (herpetic 6 cases, disciform 4, recurrent erosions 3, traumatic 6, ulcer 1, corneal erosion 1, ulcerative pannus 4) treated with repeated topical applications of ether, with satisfactory results. The only case where it was ineffective was one of serpiginous ulcer.

The ether applications are analgesic, and not painful as are iodine applications. Kalfa reports briefly an intractable case of corneal herpes following a cataract extraction, which case responded promptly to ether applications.

Ray K. Daily.

Leopold, I. H. **Keratoconus posticus circumscriptus**. Arch. of Ophth., 1943, v. 30, Dec., pp. 732-734.

Two types of abnormal curvature of the posterior surface of the cornea have been described. One form is called keratoconus posticus and is characterized by a perfectly regular curvature, but with unusually short radius, for the entire posterior surface. The other form, called keratoconus posticus circumscriptus, consists of a localized area of increased curvature. In each type the anterior corneal curvature is perfectly regular and the abnormality is the result of thinning of the posterior corneal layers.

A case of this circumscribed lesion is reported in a Negress of 36 years. The left cornea showed an oval opacity below and nasal to the pupillary zone. Slitlamp examination disclosed that the cornea was only about one half the normal thickness in this area and that the thinning was confined to the posterior layers. The eye showed no other evidence of disease and no sign of trauma. The best vision obtained with correction was 6/30. The patient stated that the vision of this eye had always been poor, and no history of injury or disease could be elicited. The author summarizes the findings in three cases previously described by other observers. (Two illustrations, references.)

John C. Long.

Philpot, F. J., and Pirie, A. **Riboflavin and riboflavin adenine dinucleo-**

tide in ox ocular tissues. Biochem. Jour., 1943, v. 37, July, pp. 250-254.

To help explain the sensitiveness of the cornea to riboflavin deficiencies, ox eyes were examined separately by microbiological estimations and by the d-amino oxidase technique. The results were much alike. By either method the riboflavin content of the vitreous, lens, aqueous, and corneal stroma was found quite low, but that of the ocular conjunctiva and corneal epithelium was much higher, about 2 mg. per 100 gm. of total flavin. The higher content of the lacrimal glands, 6.5 mg. per 100 gm., and of the meibomian glands, 4 mg. per 100 gm., suggests that a part of the riboflavin content of the corneal epithelium comes from the tears and the meibomian secretion. This is of interest because in riboflavin deficiency advancement of limbal blood vessels on to the cornea may occur or may be hastened if the deficiency is not made up from the secretions of the lacrimal and meibomian glands.

Charles A. Bahn.

7

UVEAL TRACT, SYMPATHETIC DISEASE AND AQUEOUS HUMOR

Duke-Elder, S., and Davson, H. **The significance of the distribution ratios of nonelectrolytes between plasma and the intraocular fluid**. Brit. Jour. Ophth., 1943, v. 27, Oct., pp. 431-434.

The authors take issue with the statement of Kinsey and Grant (Amer. Jour. Ophth., 1943, v. 26, July, p. 781) that at equilibrium the concentrations of the substance considered, electrolyte or nonelectrolyte, will not be equal in both fluids when there is a flow of aqueous humour away from the anterior chamber by some drainage channel, namely Schlemm's Canal. The fal-

lacy of this statment is proved mathematically by the second law of thermodynamics, which states that a system of this kind can only be maintained at a nonequilibrium position by the continued performance of work on it. Drainage of fluid away from the anterior chamber is not capable of performing the necessary work on the system, so that in the absence of secretory activity the concentration changes claimed are excluded by the law referred to. (References.)

Edna M. Reynolds.

Ford, Rosa. **Iridocyclitis and chorioiditis due to "silent" sinusitis.** Brit. Jour. Ophth., 1943, v. 27, Oct., pp. 469-471.

Five cases of iridocyclitis and chorioiditis due to silent sinusitis are reported. The author recommends that, if all investigations prove negative in a case of uveitis, latent sinusitis, giving no sign of its existence except its remote toxic effects, be suspected and treated. (References.)

Edna M. Reynolds.

Garrow, A., and Lowenstein, A. **Calcification in a hydrophthalmic eye.** Trans. Ophth. Soc. United Kingdom, 1942, v. 62, pp. 189-197. (See Section 8, Glaucoma and ocular tension.)

Louria, Milton. **Tuberculous adenitis with iridocyclitis.** Quarterly Bull. Sea View Hosp., 1942, v. 7, Oct., pp. 444-447.

A 14-year-old schoolboy had fever, swollen glands in the groin, swelling of the eyelids, disturbance of vision, and a rash on the legs. There were frequent drenching sweats, particularly at night, and the temperature ranged from 101 to 104 degrees. The ocular diagnosis was of bilateral iri-

docyclitis, and both this and the inguinal adenitis were attributed to tuberculosis of an acutely disseminated character. There were a number of adhesions of the iris to the anterior lens capsule, with many large spots on the posterior surface of the cornea. Excised inguinal nodes showed tuberculosis. After a positive skin reaction with a 1-to-10,000,000 dilution of tuberculin (bacillary emulsion), the patient was placed on tuberculin therapy. In ten weeks the body weight had increased from 128 to 163 pounds, and almost all the ocular and other symptoms had disappeared, with recovery of vision of 20/20 in each eye. The author feels uncertain how much credit should be given to the tuberculin therapy.

W. H. Crisp.

Lowenstein, O., and Givner, I. **Pupillary reflex to darkness.** Arch. of Ophth., 1943, v. 30, Nov., pp. 603-609.

In 1939 Lowenstein described a pupillary reflex which he called the "reflex to darkness." In order to elicit this reflex both eyes of the subject tested are adapted to a constant level of illumination in which darkness is a periodic stimulus. The resulting movements of the pupils are recorded by pupillography. The phenomenon consists of primary dilatation followed by the second phase of contraction and secondary redilatation.

The authors state that the reflex to darkness is frequently more susceptible to the influence of pathologic conditions than is the reflex to light. In a patient operated on for pinealoma, dissociation between the reflexes to light and to darkness was observed. The former were practically absent, and the latter were exaggerated. This dissociation of pupillary reflexes suggests the existence of separate pathways for the

reactions to light and to darkness. The authors believe that there must exist at least one point in the brain where the pathways of the reflexes to light and to darkness are not identical. (6 figures, references.)

R. W. Danielson.

Riddell, W. J. **Iris color changes in middle life.** Trans. Ophth. Soc. United Kingdom, 1942, v. 62, pp. 183-187.

The author classified the color of the iris according to (1) the general color (blue, gray, green, yellow, tan, and chocolate), (2) the presence or absence of diffuse color, and (3) the presence or absence of spots or little masses of color. A series of 500 patients, 220 males and 280 females, were coded by this method. It was shown that the different classes were not homologous in respect to sex.

The changes in eye color seem to occur regularly during adult life, and to occur much earlier in women than in men. The changes tend generally to range from a class containing an excess of men to one containing an excess of women, and from the more masculine or juvenile classes to the more feminine or senile classes. (2 tables, references.)

Beulah Cushman.

Scobee, R. G., and Slaughter, H. C. **Endophthalmitis phaco-anaphylactica.** Amer. Jour. Ophth., 1944, v. 27, Jan., pp. 49-52. (2 illustrations, 1 table, references.)

8

GLAUCOMA AND OCULAR TENSION

Benedict, W. L. **The surgical treatment of glaucoma.** Pennsylvania Med. Jour., 1942, v. 45, Aug., pp. 1167-1172.

The various surgical procedures in

general use are briefly reviewed, with some indication as to the type of case suitable for each operation.

W. H. Crisp.

Boyd, J. L. **Quantitative comparison of methods of administering physostigmine.** Arch. of Ophth., 1943, v. 30, Oct., pp. 521-525.

Physostigmine was applied to the eyes of albino rabbits by several different methods and the concentration of the drug in the aqueous was then determined by bioassay on white mice. It was found that application of a 0.25-percent physostigmine-salicylate ointment gave a higher concentration in the aqueous humor than instillation of a 0.5-percent solution in distilled water. A lamella containing 0.11 mg. of physostigmine salicylate was twice as efficient as the ointment. A 0.5-percent physostigmine sulphate solution in a water-soluble jelly and a similar solution containing a wetting agent each produced a concentration in the aqueous approximating that produced by the lamella. The wetting agent, zephiran, is incompatible with salicylates, so physostigmine sulphate was used in these experiments. Iontophoresis employing a 2-ma. current for two minutes, with a 0.1-percent aqueous solution of physostigmine salicylate, increased the concentration $3\frac{1}{2}$ times that obtained by instillation of 0.5 percent physostigmine sulphate with a wetting agent. Four instillations of a 0.5-percent physostigmine-sulphate solution containing zephiran gave a concentration twice that obtained by four instillations of a 0.5-percent aqueous solution but less than half that obtained by inotophoresis with a 0.1-percent aqueous solution and a current of 2 ma. for two minutes. (References.)

John C. Long.

Freiman, George. **Clinical study and review of tonometry.** *Arch. of Ophth.*, 1943, v. 30, Oct., pp. 526-546.

This is a detailed discussion of the principles and instruments involved. Direct manometry is the only scientifically accurate method of measuring the true intraocular pressure. As this is clinically impractical, all methods of tonometry involve indirect calculations based on the incompressibility of the globe.

The Schiötz instrument is discussed in great detail, comparing this instrument with the McLean among others. Schiötz insisted that measurements be recorded in terms of the scale-reading with the particular weight used, rather than in millimeters of mercury. Recording in millimeters of mercury gives the impression of a degree of scientific accuracy that is not yet attainable. The McLean instrument is essentially a modification of the Schiötz type. It differs mainly in that (1) the scale is inverted so that it can be read close to the patient's eye, (2) the weight is constant, and (3) the instrument is read directly in millimeters of mercury. The author reports a series of 410 measurements with the Schiötz and McLean tonometers, giving a comparison of their readings. Adler, Berner, and Meyer had reported that the Schiötz, McLean, and Gradle instruments were sufficiently accurate for clinical purposes. The Bailliart and Souter tonometers differ from any of the above in that the pressure is applied to the eye by a spring rather than by gravity. Each of these instruments is found valuable by some workers.

Attention is called to the inaccuracy with which some of the tonometers are made. A wide variation has been found in the weight and construction of Schiötz instruments. In recognition of

the need for standards in construction, the American Academy of Ophthalmology and Otolaryngology has appointed a Committee on Standardization of Tonometers. (2 tables, references.)

John C. Long.

Garrow, A., and Lowenstein, A. **Calification in a hydrophthalmic eye.** *Trans. Ophth. Soc. United Kingdom*, 1942, v. 62, pp. 189-197.

The author reports a case of monocular hydrophthalmos because of its possible relationship to the group of congenital anomalies known as phacomatoses (birth marks) and particularly to Sturge Weber's disease. In that disease hydrophthalmos is associated with nevus flammeus of parts supplied by the trigeminal nerve and convulsive symptoms indicative of changes in the cerebral blood vessels.

The patient was ten years old when the right eye was removed. She had been first seen at the age of 3½ years, with a history of having had the large eye for one year. The tension varied between 40 and 60 mm. Schiötz until after a trephining during the first year of observation, when the tension became and remained subnormal. Three years later the eye became irritable, and it was so at intervals until still three years later it began to shrink and so was removed.

The cornea contained many blood vessels and blood was present in the substance of the cornea. Descemet's membrane was folded and one rupture found. The anterior chamber was densely packed with connective tissue, and a wavy piece of Descemet's membrane was found embedded in this connective tissue. The anterior capsule of the lens was folded and formed a wavy uninterrupted line. There was a broad layer of subcapsular organized exudate.

Degenerated lens substance was found to be freely sprinkled with lime. Fibrinous exudate was present in front of and behind the choroid, and the ciliary body and choroid were separated from the sclera. Fluid infiltration had divided the ciliary body into bundles. The choroidal separation from the sclera seemed to be associated with the fluid effusion, and there was also a large subretinal effusion.

Around the optic nerve there was an overgrowth of blood vessels resembling an angioma, and covered by a sheet of connective tissue. Another mass of vascular spaces was found at the anterior boundary of the retina. The calcification of vessels of the angioma was not uniform.

The retinal tissue and blood vessels were heavily impregnated with lime, and there were varying degrees of calcification of the retinal blood vessels. Some ganglion cells of the retina were also calcified. (8 illustrations.)

Beulah Cushman.

Schoenberg, M. J. **The technique of tonometry and care of tonometers.** *Amer. Jour. Ophth.*, 1944, v. 27, Jan., pp. 70-71.

Swan, K. C. **Carbaminoylcholine chloride in petrolatum.** *Arch. of Ophth.*, 1943, v. 30, Nov., pp. 591-592.

Carbaminoylcholine chloride is a synthetic drug introduced in 1932 as a long-acting substitute for acetylcholine. Inasmuch as the drug produces miosis and cyclotonia and decreases intraocular pressure, it is used as an agent in the treatment of glaucoma.

The drug has a high affinity for water and a low affinity for lipids. Like other substances with these properties, it penetrates the normal human and rabbit cornea more readily when ad-

ministered as a suspension in a pure olive-oil or petrolatum base than when given in a simple aqueous solution or in one containing zephiran chloride or in ointment bases containing hydrous wool fat.

Clinical experiments were made on a group of 15 eyes (nine patients) with chronic noncongestive glaucoma. Pilocarpine administered three or four times daily was ineffective in controlling the tension or in preventing visual loss. Carbaminoylcholine chloride (1.5 percent in 0.03-percent solution of zephiran chloride) administered three to four times daily was effective in keeping the tension below 30 mm. Hg (Schiotz) and in preventing loss of visual field in 11 of the 15 eyes during periods of five months up to three years. However, carbaminoylcholine chloride (1.5 percent) in petrolatum administered only twice daily was equally effective in controlling the tension in these eleven eyes. In two eyes the tension was not consistently controlled by carbaminoylcholine chloride in solution of zephiran chloride when the drug was administered at home three to four times daily, whereas administration of the ointment twice daily at home was successful. (References.)

R. W. Danielson.

9

CRYSTALLINE LENS

Falls, H. F., and Cotterman, C. W. **Genetic studies of ectopia lentis.** *Arch. of Ophth.*, 1943, v. 30, Nov., pp. 610-620.

The present report on the inheritance of ectopia lentis is based on the study of a single genealogical tree displaying this relatively rare ocular anomaly. The pedigree includes six generations, in which 157 individuals were examined.

Twenty-four with ectopia lentis were observed, five as judged by the history were probably affected, and two unaffected members were regarded as gene carriers.

The pedigree of ectopia lentis displays dominant inheritance of the anomaly. No conspicuous associated anomalies of the iris, cornea, or pupil were observed. Cataractous changes were common sequelae of the dislocation of the lenses. Chronic noninflammatory glaucoma and secondary glaucoma were frequently noted. Anthropometric measurements taken on all members of this pedigree failed to indicate any association between ectopia lentis and the length of the extremities, such as is found in the syndrome of arachnodactyly. To a considerable degree ectopia lentis adversely affects the physical and mental well-being, the educational achievement, and the economic status of the affected person.

The authors give a résumé of the surgical approach and emphasize that surgical intervention in the treatment of ectopia lentis is a serious and dangerous undertaking. The "treatment" is, of course, preferably prophylactic. (2 figures, references.)

R. W. Danielson.

Fortin, E. P. **Considerations on the lens.** Arch. de Oft. de Buenos Aires, 1942, v. 17, May, p. 297.

From the appearance of numerous histologic preparations of animal and human ocular tissues, the author speculates (1) as to a hitherto unknown function of the iris, consisting of wiping the anterior lens capsule in a fashion similar to the action of an automobile windshield-wiper; (2) on the architecture of lens fibers and the existence of the zonule; and (3) on the na-

ture of presbyopia and the mechanism of accommodation. The article, which is profusely illustrated, does not lend itself to abstracting.

Plinio Montalván.

Scobee, R. G., and Slaughter, H. C. **Endophthalmitis phaco-anaphylactica.** Amer. Jour. Ophth., 1944, v. 27, Jan., pp. 49-52. (2 illustrations, 1 table, references.)

Smith, S. E., and Barrentine, B. F. **Hereditary cataract.** Jour. of Heredity, 1943, v. 34, Jan., p. 8.

The authors report the presence of cataract in albino rats, starting a few days after birth and becoming completely mature within a few days. No definite cause for the lens changes could be given. Dietary deficiency was probably not responsible, since all the rats were maintained on an adequate stock diet.

F. M. Crage.

10

RETINA AND VITREOUS

Ballantyne, A. J. **The ocular manifestations of spontaneous subarachnoid hemorrhage.** Brit. Jour. Ophth., 1943, v. 27, Sept., pp. 383-414. (See Section 12, Visual tracts and centers.)

Drews, L. C., and Minckler, J. **Massive bilateral preretinal type of hemorrhage associated with subarachnoidal hemorrhage of brain.** Amer. Jour. Ophth., 1944, v. 27, Jan., pp. 1-15. (8 illustrations, references.)

Knapp, Arnold. **Peripheral retinal holes without detachment.** Arch. of Ophth., 1943, v. 30, Nov., pp. 585-590.

The author reviews the literature and reports five cases showing peripheral retinal holes without detachment. It is believed that the lack of detachment even in the presence of a hole is

due to formation of chorioretinal adhesions and to the fact that for some reason the usual factors in the production of detachment have not become operative. Knapp reviews the usual causes of detachment, such as gravity and adhesions, and liquefaction and movement of the vitreous. The non-development of a retinal detachment may be due to absence of any one of these factors.

As for treatment, the patient should, of course, be kept under observation. Some authors believe surgery is indicated, but Knapp does not favor it. At any rate, if surgery is attempted some very simple procedure should be used. (References, 1 figure.)

R. W. Danielson.

Lindsay-Rea, R. **Technique of retinal-detachment operations.** Trans. Ophth. Soc. United Kingdom, 1942, v. 62, pp. 277-284.

The author describes the method with which he has obtained good results in the operative care of retinal detachment. Retrobulbar injection is used and the cornea is kept clear for use of the ophthalmoscope during the operation. A fine needle with thread is passed through the sclera at a point corresponding to the meridian in which the tear is situated. This is used in turning the eyeball. The position of the tear is marked with India ink. In this region a bent catholysis-needle is inserted, and the fundus is then examined. If the needle is not at the tear it is to be reinserted. Upon localization a barrage of diathermy micropunctures is made around the area. Glass or ivory retractors should be used. A continuous fine catgut suture is used to close the conjunctiva. The eye is examined one week later. The retina is usually found replaced by two or three weeks later.

Pinhole spectacles are then put on and plenty of light admitted to the room. The patient is allowed up at the end of three or four weeks and the pinhole spectacles are used two weeks longer. (7 illustrations.) Beulah Cushman.

Lloyd, J. P. F. **Subhyaloid hemorrhage following "T. A. B." inoculation.** Brit. Jour. Ophth., 1943, v. 27, Oct., p. 461.

A case of extensive subhyaloid hemorrhage in front of the macula is reported following routine immunization with T.A.B. (typhoid-paratyphoid). Vision was reduced to hand movements. It had not improved a month later, although the retinal vessels could be seen through the vitreous haze. After an interval of two months, there was still considerable unabsorbed hemorrhage in the vitreous.

Edna M. Reynolds.

Mutch, J. R., and Mackay, D. **The detection and significance of melanophore expanding substance in urine and blood with special reference to retinitis pigmentosa.** Brit. Jour. Ophth., 1943, v. 27, Oct., pp. 434-449.

Vertebrates show two striking examples of pigment migration. One is migration of pigment within the skin melanophores of cold-blooded vertebrates. The other is migration of the retinal pigment in amphibia and fish in response to varying light intensity.

It is well established that the skin-melanophore response is mediated by a melanophore-dispersing hormone (B hormone) secreted by the intermediate lobe of the pituitary. Mammals, including man, have no skin melanophores like those in amphibia and fishes. Yet the pituitary glands in mammals are rich in B hormone or a substance with similar action. Extracts from the hypo-

thalamus, the eye, blood, aqueous humor, cerebrospinal fluid, urine, and colostrum also show the presence of B hormone.

The only cells in mammals which might be comparable to the skin melanophores of amphibia and fish are the retinal pigment cells of the eye. B hormone might therefore mediate changes in the pigmented layer of the retina. Experiments to date have not proved that B hormone plays any physiologic role in vision. There are no data to indicate the role of B hormone in pathologic conditions such as retinitis pigmentosa.

It was the recognition of retinitis pigmentosa as a feature of the Laurence-Moon-Biedl syndrome which first prompted the idea that the latter disease might be associated with diencephalic and endocrine disturbances. Dax, by his demonstration that urine samples from 20 retinitis pigmentosa patients when injected into frogs expanded the skin melanophores (*Amer. Jour. Ophth.*, 1938, v. 21, p. 1198, and 1939, v. 22, p. 572) led to renewed interest in the interpretation of retinitis pigmentosa as an endocrine or diencephalic disturbance.

The most widely accepted theory of the etiology of retinitis pigmentosa is that the degeneration of the neuroepithelium is primary and the vascular sclerosis secondary. Another theory is that it is due to an endocrine disturbance. The abnormal hormonal influences are believed to arise from a congenital lesion in the pituitary-hypothalamic system. The presence of a melanophore-expanding substance in the urine of retinitis-pigmentosa patients is considered particularly significant.

Experiments are reported in which blood samples from nine retinitis-pig-

mentosa patients were assayed and compared with blood samples from seven normal controls. Details are given of the process of extraction and assay employed. Only three of the nine retinitis-pigmentosa samples were definitely positive, and two of the seven control samples gave a positive result. It is concluded that the blood of retinitis-pigmentosa patients does not regularly contain a melanophore-expanding substance, and that such a substance may occasionally be present in normal bloods.

A further experiment is described to show that in the rabbit the B hormone, injected intravenously, disappears very rapidly from the circulation. (3 tables, references.) Edna M. Reynolds.

Post, L. T., and Sanders, T. E. **Temporal arteritis.** *Amer. Jour. Ophth.*, 1944, v. 27, Jan., pp. 19-25; also *Trans. Amer. Ophth. Soc.*, 1943, v. 41. (3 illustrations, references.)

Steven, D. M. **Experimental human vitamin-A deficiency. The relation between dark adaptation and blood vitamin-A.** *Trans. Ophth. Soc. United Kingdom*, 1942, v. 62, pp. 259-275.

The author has attempted by experiments to discover whether there is any correlation between poor dark-adaptation or night blindness and low values of blood vitamin-A. Previous experiments have presented evidence that for each individual there is a critical level of blood vitamin-A below which dark adaptation begins to show impairment, this being an individual characteristic which may differ greatly in different persons.

For the experimental work the author kept volunteers on a controlled diet deficient in the one factor he wished to investigate.

After pooling the findings in nine subjects he comes to the conclusion that all cases of night blindness which show blood vitamin-A values above 75 i.u. per 100 ml. of plasma are unlikely to be of nutritional origin. In six individuals a high degree of correlation was found between the rise of the visual threshold and the fall of the blood-vitamin-A level. (6 figures, 3 tables, references.)

Beulah Cushman.

11

OPTIC NERVE AND TOXIC AMBLYOPIAS

Adrogué, E., and Insausti, T. **Etiology of papilledema.** Arch. de Oft. de Buenos Aires, 1942, v. 17, May, p. 285.

The authors record in tabulated form 140 cases of papilledema studied during the last four years. Table no. 1 contains the findings, diagnosis, and localization in each case. Table no. 2 is a résumé of table no. 1. Table no. 3 presents the etiology of every case in this series. Table no. 4 records the intra-ventricular pressure. In three subtables are presented the clinical data concerning the cases of unilateral papilledema, those with bilateral papilledema more marked on one side, and those in which the papilledema was equal in both eyes. The article does not lend itself to abstracting.

Plinio Montalván.

Astakhova, A. P. **The action of anti-freeze on the eye.** Viestnik Oft., 1943, v. 22, pt. 2, pp. 33-35.

The author examined ophthalmoscopically thirty patients poisoned with anti-freeze. In six fatal cases directly due to heart and circulatory failure, the retina was cyanotic. In five fatal cases, because of secondary degeneration of the internal organs, the fundus veins

were dilated. There was one case of optic neuritis and one of pale discs. In 17 cases the fundus was normal. The conclusions are that anti-freeze is a neurovascular poison, with no predilection for the optic nerves.

Ray K. Daily.

Montgomery, E. C. **Intraocular neuritis.** Jour. Iowa State Med. Soc., 1943, v. 33, July, p. 298.

Two children, ten and twelve years old, had acute intraocular neuritis. In the older child after sulfadiazine therapy and tonsillectomy, the neuritis subsided within 11 months with 20/20 vision, but a peripheral visual-field contraction remained. In the younger child, under the same therapy, vision returned to 20/20 after two months. In view of the relationship of optic neuritis to disseminated sclerosis, the author believes that during the next few years these patients should be watched for neurologic symptoms.

T. M. Shapira.

Potter, W. B. **Visual impairment during tryparsamide therapy.** Arch. of Ophth., 1943, v. 30, Nov., pp. 669-687.

This review of the literature points out that, while tryparsamide is considered one of the best drugs in the treatment of neurosyphilis, unfortunately many cases of damage to the visual system have been reported after its use. Elucidation of the process, and of the character and frequency, of untoward visual effects from tryparsamide has remained incomplete.

The associated ocular problems lend themselves to general outline as follows: (1) as to the ocular effects of tryparsamide when syphilitic disease of the optic nerve preëxists; (2) as to the designation of lesions according to whether the damage to the retina or

optic nerve results primarily from syphilis, from the use of the tryparsamide, or from the fact that the tryparsamide was used during a period of involvement, inactive or active, of the optic nerve in a syphilitic process (Jarisch-Herxheimer reaction); (3) as to evaluation of the objective and subjective findings with regard to modification of tryparsamide therapy; (4), as to evaluation of factors related to individual dosage, number of injections, and subsequent series of injections; (5) as to the nature of the reaction to tryparsamide from the visual aspect; (6) as to the nature of the tryparsamide reaction from the pathologic aspect.

On all of these problems there is a difference of opinion among investigators and clinicians. Only a few of the statements and conclusions can be given. The drug is contraindicated except in the treatment of neurosyphilis, for which it is usually employed after six months of preliminary treatment with arsphenamine. The usual dose is 3 gm. intravenously. A minimum course consists of 12 weekly injections, although more prolonged use of the drug is ordinarily productive of better results. Primary atrophy of the optic nerve is the most frequent sort of neuropathy and is most frequently due to syphilis. Several authors have noted that there is no relationship, either qualitative or quantitative, between the appearance of the nerve head and the functional capacity of the nerve. Not all atrophy of the optic nerve occurring when the serologic reactions are positive is of the primary type; other changes in the oculonervous pathway may be at fault. Atrophy of the optic nerve cannot always be designated as primary or secondary on the basis of ophthalmoscopic examination alone. In optic-nerve atrophy, changes in the

fields usually occur previous to pallor of the optic disc.

There appears to be no evidence that sex, race, or age of patient is related to untoward visual effect during therapy with tryparsamide. A medicolegal case is reported where the patient won a suit on the ground that tryparsamide therapy was continued in spite of the plaintiff's complaint of increasing visual disturbances. Opinion seems equally divided between those physicians who when primary syphilitic optic-nerve atrophy is present would withhold the drug and those who under similar conditions would favor its use.

That the differential diagnosis between the normal appearance of the optic disc and that of primary syphilitic optic-nerve atrophy is not always clearly defined is attested by the fact that the color of the disc, the visual acuity, and the visual-field findings may yield contradictory evidence. But examination of the visual fields seems to offer the most effective information in regard to the exact basis of impairment of vision.

Suggestions to explain visual involvement include a hypothetical toxic effect of the drug on the nerve or retina, idiosyncrasy to the drug, factors superimposed by drug therapy on active syphilitic involvement (reactivation of a process) and the Jarisch-Herxheimer reaction. Problems such as the valence of the arsenic in the preparation, the structure of the tryparsamide molecule, and the factors of excretion and metabolism have been considered without establishment of conclusive opinions. (Bibliography.) R. W. Danielson.

Turner, J. W. A. **Indirect injuries of the optic nerve.** *Brain*, 1943, v. 66, June, pp. 140-151.

The author's study is based on 46 cases of indirect optic-nerve injury and excludes direct involvement by a projectile. These cases represent approximately 1.5 percent of 3,250 head-injury patients observed in two English head-injury centers. Included are falls, air-raid casualties, bicycle and motor-cycle accidents, accidents to pedestrians, car and lorry accidents, and miscellaneous.

In 35 cases, the impact was on the forehead or supraorbital region and on the same side as the visual loss; in six cases, the impact was in the region of the external angular process. In only one case was there a posterior head injury, and a contrecoup from an occipital injury was never observed to damage the optic nerve. The effect on vision was immediate and no delayed blindness was observed. Visual improvement, if it occurs, usually begins about the third day, rapidly progresses, and terminates about the fourth week. The prognosis of optic-nerve injuries is worse than that of injuries to other cranial nerves. The final corrected visual acuity in these 46 cases was: 6/60 or less, 23; 6/18 to 6/60, 21; better than 6/18, 14 cases. Visual fields included 8 cases with scotoma, pericentral, paracentral, and centrocecal, as the dominant feature. In 19 cases the defect was predominantly in the peripheral field, and in 19 cases the field changes were apparently mixed. In the severe cases disc pallor was usually first noted about the end of the third week, whereas in the less severe cases it occurred somewhat later. In severe injuries the pupils were equal, the pupil of the affected side showing a sluggish or no reaction directly, but giving a brisk consensual reaction. Pupillary inequality occurred only if third-nerve injury was coincidental. In only four cases was any abnormality found in the

optic canal by X ray. The author believes that the dominant pathologic lesion was a hemorrhage or thrombosis in the intracranial part of the optic nerve. Violent impingement against the bony wall of the canal ruptures small vessels in the septa of the nerve, with secondary local thrombosis and softening. Charles A. Bahn.

12

VISUAL TRACTS AND CENTERS

Balado, Manuel. **Retinal areas and cortical sectors.** Arch. de Oft. de Buenos Aires, 1942, v. 17, May, p. 250.

The author discusses the difference between the campimetric findings in lesions of the occipital cortical area and those involving the nerve-fiber bundles at their entrance to the globe, such as seen in glaucoma, toxic amblyopia, and juxtapapillary chorioretinitis. In the latter group of diseases the scotomata do not follow the vertical and oblique meridians of the visual field; whereas in the field defects produced by lesions situated in the cortical area the vertical meridian passing through the center of the fovea always divides the visual field into two halves, a blind half and a seeing half. The anatomical basis is explained. (Illustrations.)

Plinio Montalván.

Ballantyne, A. J. **The ocular manifestations of spontaneous subarachnoid hemorrhage.** Brit. Jour. Ophth., 1943, v. 27, Sept., pp. 383-414.

Five cases of nontraumatic subarachnoid hemorrhage are reviewed and the pathological findings are given in detail because of their bearing on the nature and origin of the ocular complications. Hemorrhages varied in distribution in each case but were widely distributed between the sheaths of the optic nerve,

in the orbit among the fat and muscles, surrounding the posterior ciliary nerves, ciliary ganglion, ophthalmic and posterior ciliary arteries, and around the vessels of the chiasm and optic tracts, as well as beneath the retina in all its layers, in front of the retina, and in the vitreous. Serial sections showed that the hemorrhages were not in continuity but were discrete and independent.

The author reviews the various theories which have been advanced as to the source of the blood found within the sheaths of the optic nerve and in the retina. Because he finds hemorrhages occurring simultaneously in so many other areas beside the optic nerve, the retina, and the vitreous, it is his opinion that such multiple hemorrhages can only be explained by a sudden rise of intracranial pressure causing stasis in all the venous channels which drain the tissues of the eye and the contents of the orbit. He suggests also that some of the clinical signs of subarachnoid hemorrhage, such as oculomotor paresis and disturbance of the conjugate movements of the eyes, may be explained by the occurrence in the mid-brain of hemorrhages similar to those found in the chiasm and optic tracts in one of the cases reported here. (31 illustrations, references.)

Edna M. Reynolds.

Clark, W. E. L. **The anatomy of cortical vision.** (Doyle Memorial Lecture.) *Trans. Ophth. Soc. United Kingdom*, 1942, v. 62, pp. 229-245. (See Section 19, Anatomy, embryology, and comparative ophthalmology.)

Fetter, W. J. **Subarachnoid hemorrhage.** *Pennsylvania Med. Jour.*, 1943, v. 46, June, p. 949.

The author reviews a series of 68

cases of subarachnoid hemorrhage hospitalized during a five-year period. He states that this disturbance occurs most frequently in cases of trauma, intracranial aneurysm, and arteriosclerosis. The abrupt onset of symptoms, signs of meningeal irritation, and the finding of an evenly blood-stained spinal fluid are characteristic. Prognosis is less favorable in hypertensives. As a rule, conservative treatment is the most satisfactory.

T. M. Shapira.

Orton, S. T. **Visual functions in strephosymbolia.** *Arch. of Ophth.*, 1943, v. 30, Dec., pp. 707-711.

Children who make little progress in learning to read are quite naturally referred to the ophthalmologist. Many, however, if not the majority of these children have adequate vision and in reality present neurologic problems. Three distinct levels of elaboration may be recognized in cases of absence of visual functions normally acquired in early life. Disturbances at these levels are recognized respectively as cortical blindness, mind blindness, and word blindness. It is thought that only at the third level does the principle of bilateral dominance apply, and there is reason to believe that at this level the records in the two hemispheres are opposite in sign, and that one record must be omitted to prevent confusion.

In studying children with reading defects the author was struck by the inability of children to differentiate "b" from "d" and "p" from "q," and by their tendency to read many words from right to left instead of in the usual direction. Some of these children showed an unexpected facility in reading mirrored print and some also were skilled in mirror writing. The author suggests that these deviations are due to failure to acquire the normal adult

pattern of complete dominance by one hemisphere of the brain. The author further offers the term "strephosymbolia," or "twisting of symbols," as being less misleading than the older term, "congenital word blindness."

The relationship between eyedness and handedness is discussed in connection with reading defects. From the data collected the author concludes that children showing the strephosymbolia syndrome represent intergrades between right-sided and left-sided familial tendencies and that the reading disability follows fairly definite hereditary trends. It is interesting to note that such reading difficulties occur much more frequently in boys than in girls. (2 figures.) John C. Long.

Scheneley, W. G., Jr. **Clinical approach to vertigo.** *Dis. Eye, Ear, Nose, and Throat*, 1942, v. 2, July, pp. 198-201.

In question-and-answer form the author explains and illustrates the relationships which exist between vertigo and the organs of orientation, namely, the eyes, the semicircular canals, the ventriculus, the utricles of the middle ear, and the joints, muscles, and viscera. Vertigo following paralysis of the extraocular muscles does not last so long as that caused by paresis of these muscles. Aural vertigo is always associated with rhythmic nystagmus, the direction of which depends on the direction of the semicircular canal involved. The anatomic relationships and pathology of rhythmic nystagmus are explained at some length, as are galvanic rotational and caloric tests. Undulatory nystagmus caused by visual defects, either congenital or acquired early, especially of the central visual mechanism, is seldom associated with vertigo.

Charles A. Bahn.

Turner, J. W. A. **Indirect injuries of the optic nerve.** *Brain*, 1943, v. 66, June, pp. 140-151. (See Section 11, Optic nerve and toxic amblyopias.)

13

EYEBALL AND ORBIT

Inciardi, J. A. **Unilateral exophthalmos.** *Dis. Eye, Ear, Nose, and Throat*, 1942, v. 2, Dec., p. 359.

The more important causes of unilateral exophthalmos are classified. Each type is described, in order that the ophthalmologist may be aided in finding the etiologic factor concerned. The author gives detail of diagnosis and treatment in many types of this condition.

F. M. Crage.

Sverdlov, D. G. **Spectacles with shields for hiding defects in and about the orbit.** *Viestnik Oft.*, 1943, v. 22, pt. 2, p. 47.

The author urges the use of an opaque lens and a shield, instead of a bandage, to cover loss of tissue in and about the orbit. The shield may be made of any plastic material, and colored to match the spectacle frame. The advantages claimed for this device are elimination of irritation, especially in warm weather, accessibility of air to the skin and wound, and a more agreeable cosmetic impression. (One illustration.)

Ray K. Daily.

14

EYELIDS AND LACRIMAL APPARATUS

Dodds, G. E. **A case showing partial deficient fusion of a maxillary process with lateral nasal process on one side.** *Brit. Jour. Ophth.*, 1943, v. 27, Sept., pp. 414-415.

The patient had distortion of the right nostril with a hiatus showing the interior of the nose. This was merely

a cleft in the cartilaginous part of the nose, and the bony structure appeared normal. There was notching of both upper eyelids at the junction of the inner third with the outer two thirds of the lid. On the inner side of the left medial canthus, there was a blind shallow pit in the skin of the nose. Conduction of tears appeared normal and the eyes were normal. (One illustration.)

Edna M. Reynolds.

Hague, E. B. **Recent advances in eyelid surgery.** *Dis. Eye, Ear, Nose, and Throat*, 1942, v. 2, Dec., p. 353.

The article outlines the basic principles of surgery in the region of the eye and describes some relatively new procedures used in correcting ptosis, spastic entropion, and blepharopoesis. In late plastic lid-repair the author joins Dunnington and Wendell Hughes in decrying the use of the pedicle grafts because they create new deformities. Instead free grafts are recommended. Special emphasis is laid on type of sutures and their removal, and the technique of dressings. F. M. Crage.

Lewis, S. J. **Aneurysm in eyelid.** *Jour. Med. Assoc. Georgia*, 1943, v. 32, June, p. 185.

A luetic 19-year-old colored female had an aneurysm of the upper eyelid, diagnosed clinically by a palpable thrill synchronous with the pulse. At operation under general anesthesia the palpebral branch of the ophthalmic artery showed an aneurysm, which was ligated. Severe proptosis and chemosis followed, but at operation subsided.

T. M. Shapira.

Paula Santos, B. **Phenomenon of Marcus Gunn.** *Arquivos Brasileiros de Oft.*, 1943, v. 6, June, pp. 68-98.

As a preliminary, the author calls

attention to the distinction between the phenomenon of Marcus Gunn (the jaw-winking phenomenon) and the Marcus Gunn sign (pressure by a retinal artery upon the vein at a crossing). The greater part of this 31-page article is occupied with a restatement of what the author describes as the most complete work on the Marcus Gunn phenomenon, the paper by H. Villard which appeared in the *Bulletin of the French Society of Ophthalmology*, 1935, pages 725-755.

From a survey which Paula Santos suspects of being not altogether complete, he estimates that the world literature of the subject records more than 149 cases. A four-page bibliography is appended.

The single new case now recorded is that of a seven-year-old Brazilian boy. His parents had no trace of consanguinity. There had been six children, five of which survived, and none of which showed organic anomalies. No case of palpebral ptosis was recorded in the ascendants. The behavior of the affected eye is shown by four excellent photographs, with various positions of the lower jaw.

The right eye had normal visual acuity, the left only $\frac{1}{8}$. The affected eye had a hyperopia of 2 D., correction of which did not improve vision. There was paralysis of the left superior rectus muscle, so that the eye had limited upward motion.

Lowering of the mandible was accompanied by elevation of the left upper lid, the elevation being proportionate to the amount of opening of the mouth. A similar effect upon the eyelid was produced by lateral movements of the jaw, the elevation being more marked when the jaw was drawn to the opposite side. Lid elevation also occurred during loud speaking or

shouting. It was not elicited by whistling, swallowing, or backward inclination of the head. The ptosis could not be corrected voluntarily, but contraction of the frontal muscle induced an increase in the palpebral fissure.

The etiology of the anomaly is entirely unknown. The author considers various speculative theories. It has been suggested that the nucleus of the lid elevator and the upper end of the masticating nucleus might be anatomically united; but this idea is embryologically untenable, because the two nuclei have distinctly different locations in the brain. Terrien has pointed out that patients affected by congenital ptosis show a slight degree of the Gunn phenomenon, usually overlooked.

W. H. Crisp.

15

TUMORS

Carter, L. F. **Dermoid tumor of the sclera.** *Amer. Jour. Ophth.*, 1944, v. 27, Jan., pp. 67-70. (3 illustrations, references.)

Foster, J. **Discission of traumatic hyaloid diaphragm.** *Brit. Jour. Ophth.*, 1943, v. 27, Oct., pp. 462-464.

A case is reported in which a dense fibrous membrane in the vitreous was divided with a Ziegler knife introduced behind the ciliary body from the temporal side. No diathermy of the Ziegler puncture was performed. At the first dressing an advanced posterior cortical cataract was evident. It progressed to maturity in less than a week. Two lens discissions were performed, and with correction (+13.5 D. sph.) vision of 6/5 was obtained. (3 diagrams.)

Edna M. Reynolds.

MacCallan, A. F. **Tumor of conjunctiva simulating tubercle due to trachoma.** *Trans. Ophth. Soc. United*

Kingdom, 1942, v. 62, pp. 79-82. (See Section 5, Conjunctiva.)

Neame, Humphrey. **Two cases of malignant melanoma of the iris.** *Trans. Ophth. Soc. United Kingdom*, 1942, v. 62, pp. 103-111.

Two cases of melanotic tumor of the iris were seen almost three years after operation. One had been treated with unscreened radium after incomplete removal by iridectomy. The other had been merely removed by iridectomy. An iridectomy is indicated when the neoplasm is small, well defined, and situated near the pupillary border, with normal intraocular tension and good vision. (9 illustrations.)

Beulah Cushman.

Picena, J. P., and Páez Allende, F. **Concerning an achromatic melanoma of the choroid.** *Arch. de Oft. de Buenos Aires*, 1942, v. 17, May, p. 255. (See also *Amer. Jour. Ophth.*, 1943, v. 26, p. 657.)

A woman eighty years old presented a retinal detachment in a blind eye. An acute attack of glaucoma developed and the eye was enucleated. Histopathologic examination disclosed a malignant melanoma of the choroid of the so-called achromatic or nonpigmented type, and special staining methods revealed the presence of granules of melanin. From morphologic studies of the tumor cells the authors agree with Masson that melanocytes are derived from the cells of the nerve sheath of Schwann and that choroidal melanomata are, consequently, neuroectodermal in origin. (Photomicrographs, bibliography.) Plinio Montalván.

Reuling, F. H. **Glioma of the optic nerve.** *Jour. Iowa State Med. Soc.*, 1943, v. 33, Sept., pp. 422-424.

Glioma of the optic nerve is quite rare, there being about one such case for every two hundred choroidal melanomas. It occurs in the first decade, with gradual loss of vision, and exophthalmos. Pain is not marked. Histologically, the tumors are classified as finely reticulated, coarsely reticulated, or coarsely fibrillated types. The case of a ten-year-old boy is presented, with history of painless exophthalmos of the left eye for two years. There was no light perception, and the optic-nerve head showed marked atrophy. The eyeball and tumor were removed. The Army Medical Museum diagnosed the tumor as "glioma of the optic nerve, chiefly coarsely fibrillated type." Gross and microscopic photographs and descriptions of the tumor are included in the paper.

Benjamin Milder.

16

INJURIES

Azarova, H. C. **A report of two cases in which glass particles remained in the eye for long periods.** *Viestnik Oft.*, 1943, v. 22, pt. 1, pp. 38-40.

During air raids the destruction of dwellings, and especially of windows, causes many ocular injuries with penetration of wood or glass splinters into the eyeball. Wood particles usually lead rapidly to suppuration. Metal particles are localized by X ray and are removed, the final outcome depending on the site and gravity of the injury, the type of metal, the skill of the surgeon, and the resistance of the patient. Glass is difficult to localize with the X ray, and it may remain in the eyeball for a long time without producing inflammatory phenomena: it is therefore often left alone in the eye if it appears to be tolerated. Nevertheless, the eye-

ball tends to free itself of the foreign body, which is sometimes extruded spontaneously after remaining in the eyeball for a long time.

Two cases are reported. A particle of glass lodged in the pars planum of the ciliary body in the left eye of a civilian, during a bombing raid. He developed a severe iridocyclitis, and was under treatment for ten weeks, during which time an unsuccessful attempt was made to extract the foreign body. After the operation the inflammation subsided, although for several months there were recurrent attacks of mild irritation, one of which was complicated by papillitis. The eye finally became quiet, and remained so for the year during which the case was under observation. There was a retinal detachment below and particles of glass could be seen in the vitreous. The second case was in a housewife whose right eye was injured during a bombing raid. She was found to have retinal detachment, and X-ray revealed a small intraocular foreign body and a large piece of glass in the antrum. The eye remained quiet, although blind, for 15 months, at the end of which time a particle of glass was spontaneously extruded from the original wound. Within the next three days the eyeball was lost from panophthalmitis, in spite of the vigorous use of sulfanilamides. Ray K. Daily.

Berens, C., Gara, P. F. de, and Loutfallah, M. **Effect of sulfonamide ointment on healing of experimental wounds of rabbit cornea.** *Arch. of Ophth.*, 1943, v. 30, Nov., pp. 631-644.

Because of the apparently growing importance of the sulfonamides in the treatment of civilian and military war wounds, it seemed desirable to study the effect of local treatment with an ointment containing 5-percent of sul-

fonamide compounds on the healing of experimental wounds of the cornea of rabbits. The wounds were produced (a) with sterile instruments (Graefe knives, wide keratomes, Hippel trephines) and (b) with similar instruments previously infected with hemolytic staphylococci.

Experimental wounds were produced on 88 corneas. Local use of the ointment referred to did not accelerate the healing of superficial or deep incised or trephined wounds of the cornea of rabbits if sterile instruments had been used to produce the injury. The ointment was of value in the treatment of wounds produced with instruments infected with *Staphylococcus aureus* hemolyticus. The results indicate therefore that local use of the sulfonamide compounds can be limited to cases in which chances of infection prevail. (References, two tables and twelve photomicrographs.)

R. W. Danielson.

Black, G. W. **Results of treatment of traumatic cataract.** *Trans. Ophth. Soc. United Kingdom*, 1942, v. 62, pp. 215-222.

The author was able to make a follow-up examination on 40 patients out of 100 who during the previous ten years had had treatment for traumatic cataract. Of the 40 cases 34 showed perforating corneal injuries, and in 15 of these an intraocular foreign body was found. Divergent deviation was present in the majority of the patients, usually appearing a few months after the accident. It did not tend to occur when the cataract was partial and stationary.

In 22 cases the vision was no better than counting fingers, there being no possibility of improvement without further operation, and the poor vision

being due mainly to dense lens remnants and blocking of the pupil. Traumatic cataract with dislocation occurred twice in children, with loss of vision in one due to secondary glaucoma, and in the other associated with retinal separation. The author emphasizes that maximum mydriasis must be maintained after any injury to the lens or until healing and absorption have taken place. Beulah Cushman.

Davis, W. T. **Military ophthalmology.** *Amer. Jour. Ophth.*, 1944, v. 27, Jan., pp. 26-44. (References.)

D'Eramo, Cayetano. **Traumatic myopia.** *Anales Argentinos de Oft.*, 1942, v. 3, Oct.-Nov.-Dec., p. 207.

In a 25-year-old man a blow on the left eye with a fist resulted in a wound of the lower eyelid and reduced vision. The retinoscope showed 8 D. of myopia and vision was 6/6 with a -8 sphere. The myopia gradually diminished and at the end of 41 days the refraction was emmetropic and vision normal.

Eugene M. Blake.

English, P. B. **Sap dermatitis and conjunctivitis caused by the wild fig (*Ficus Tumila*).** *Med. Jour. Australia*, 1943, v. 1, June 26, p. 578.

Several cases are reported in soldiers. They were suffering from blistering of the skin of the forehead, the cubital fossae, and the genitals, as well as intense conjunctivitis and severe irritation of the nasopharynx. These men had been working in an area which contained two wild fig-trees. It is evident that the sap of the fig tree caused these lesions. Four cases of affliction of the eye are described in detail. Of these, two showed defect in the corneal epithelium. Only one was permanently impaired. In all the other

cases the lesions healed within a few days without permanent impairment of vision. Gertrude S. Hausmann.

Harkness, G. F. **Industrial ophthalmology.** *Industrial Med.*, 1943, v. 12, Oct., pp. 658-662. (See Section 18, Hygiene, sociology, education, and history.)

Kaminskaya, Z. A. **Clinical symptoms and therapy of indirect ocular injuries.** *Viestnik Oft.*, 1943, v. 22, pt. 2, p. 7.

This is a study of the pathology of the posterior ocular segment in ocular contusions, based on material seen in a base hospital. Ocular contusions were found most frequently in injuries of the lower outer orbital margin and the zygomatic arch. They occurred less frequently in injuries of the superior outer orbital margin, and were quite infrequent in injuries of the inner orbital wall and the nose. The history is fairly characteristic. Total loss or marked reduction of vision occurs immediately after the injury; frequently the patient sees a red fog. The symptoms may occur immediately, or they may be delayed for several days or months. Usually in cases of total loss of vision there was hemophthalmos, and in cases complaining of red vision there were vitreous hemorrhages. Hemorrhage into the vitreous associated with tears of the posterior hyaloid membrane is seen in the form of floating red bands. Reaching the anterior hyaloid membrane the blood becomes applied to its surface, or it permeates into the retrolental space, where it appears as a red band behind the lens. In some cases the vitreous becomes detached, and the hemorrhage is preretinal. In extensive detachments blood fills the folds in the hyaloid

membrane, and one sees reddish bands, swinging with movements of the eyeball, but not floating as do hemorrhages within the vitreous. In addition to vitreous hemorrhage, retinal hemorrhages of various intensity may occur. There appears to be no clear relation between the site of the retinal hemorrhage and that of the injury, although hemorrhages are observed more frequently on the side of the injury. Peripapillary hemorrhages are most frequent; they have a striated appearance, pointing to their location within the nerve layers of the retina. Second in frequency are macular hemorrhages. These may be continuous with the peripapillary hemorrhages, when they are also striated; or they may be limited to the macula and round in form, indicating localization in the peripheral retinal layers. Edema of the disc and retina may be encountered among the immediate symptoms. Choroidal ruptures in military injuries have an appearance entirely different from those seen in civil injuries. They may be found in any portion of the fundus and have the appearance of broken zig-zag intertwining lines. One gets the impression that the eyeball has suffered a severe insult as a result of which, so to speak, the choroid fell to pieces. Macular holes have occurred. The author saw several traumatic retinal detachments, but never a separation from the ora serrata. Optic neuritis was rare and recovered without leaving any sequelae. A few cases were without objective signs to account for the visual loss; most of these recovered vision although not always entirely. In these cases there was probably an edema of the external retinal layers, which when involving the macula caused immediately an intense impairment of vision. Partial permanent

visual loss is due to subsequent macular degeneration.

The late results of hemophthalmus are dense vitreous opacities, which reduce vision and may lead to retinal detachment. In several cases the author found synchysis scintillans. After absorption of the retinal hemorrhages, she found in several cases yellowish foci grouped in the periphery around the terminal vessels, and similar to those seen in the macula in hypertensive retinopathy. Usually edema of the retina subsided and vision was restored, although in one case there was a macular hole. Atrophic foci in the choroid are frequent. Hypotony, immediate or late, without iridocyclitis was seen in several cases.

The pathogenesis of these injuries Kaminskaya sees as a concussion within the eyeball, which in the anterior ocular segment causes subluxation of the lens, and in the posterior segment sets up a reverse wave which separates the vitreous from the membrana limitans interna. The vacuum left between the vitreous and the retina is conducive to hemorrhage, but the important factor is the change in the vessel wall itself. The primary spasm increases the permeability of the vessel wall, and the secondary dilatation facilitates the escape of blood into the tissues. The changes in the vascular wall are caused by the traumatic disturbance in ocular innervation. The hypotony usually present in a contusion of the eyeball indicates that an innervational disturbance in the secretory metabolism of the eyeball has taken place.

The immediate therapy should consist in inhalations of amyl nitrite to relieve the angiospasm. Later comes administration of calcium (1) by ionization, (2) internally, and (3) intra-

muscularly to diminish permeability of the vessel wall. Vitamin C serves the same purpose. To prevent subsequent development of retinitis proliferans, Zur Nedden's operation may be performed in extensive vitreous hemorrhages. For the absorption of vitreous opacities, iodine is given by ionization and internally. Blood transfusion was effective in one out of two cases. For the hypotony there is as yet no effective treatment. Ray K. Daily.

Kaminskii, D. C. **Hole in the macula as a result of ocular contusion by firearms.** *Viestnik Oft.*, 1942, v. 22, pt. 2, pp. 25-31.

Seven cases observed in an evacuation hospital are reported. Six were injured with a fragment of a mine, and one with a bullet. In six cases the ocular trauma was indirect, being associated with contusions and damage to the outer orbital wall. One case showed direct injury to the eyeball. In two cases the pathology developed six weeks after the injury and was limited to the macula, with the exception of chorioretinal foci at the periphery, which probably resulted from hemorrhages. The author believes that the pathology in the retina caused by contusion is similar to the process taking place in the brain; an edema of colloids, as a result of cellular shifts, and a disturbance in metabolism due to innervational disturbances in the vessel walls. Depending on its intensity, the edema may subside with functional recovery, or the macula may degenerate leaving a hole.

In three cases, immediately after the contusion there were vitreous opacities and retinal hemorrhages. After absorption of these the defect in the macula became apparent. The retinal hemorrhages, and also probably hemorrhages

into the suprachoroidal space, aggravated the destructive process in the injured macula. In one case of direct contusion the fragment entered the right orbit temporally and lodged in the superior orbital fissure. The foreign body thus traversed the entire depth of the orbit, passing between the outer orbital wall and the eyeball. No choroidal or retinal tear could be found, but the contusion led to pathologic changes in the macular colloids with subsequent macular degeneration. These six cases, differing in the type of injury and the extent of damage, have the same final visual result, a central scotoma. For therapy the author suggests antiedematous agents, locally and intravenously. (7 illustrations.) Ray K. Daily.

Karandasheva, K. M. **A case of ocular contusion by a bullet.** *Viestnik Oft.*, 1943, v. 22, pt. 2, pp. 48-50.

Entering at the outer side of the eyeball a bullet lodged in the posterior portion of the orbit. There was exophthalmos, with limitation of motion, choroidal and vitreous hemorrhages, and central retinal edema. Vision was 1/1000. The bullet was extracted a week after the injury, and at discharge the patient's vision was 2/100. The unusual feature of this case is the entrance of the bullet into the orbit without splintering the bone or shattering the eyeball. (3 illustrations.)

Ray K. Daily.

Kaznelson, A. B. **Gunshot lesions of the orbit.** *Viestnik Oft.*, 1943, v. 22, pt. 2, pp. 13-23.

In the present war, injuries caused by mine splinters are more numerous than bullet wounds. Of orbital wounds in an evacuation hospital, 23 percent were produced by bullets and 77 percent by mine fragments. The wide use

of mines and grenades results in numerous cases of multiple wounds of the face and eyes caused by flying splinters. The type and character of the damage depend on the caliber and size of the bullet, the shape of the splinters, their velocity, and the distance they travel. Because of the low resistance of the thin bony walls of the upper jaw, a shot from a distance of 800 to 1000 meters produces a through-and-through ragged wound. From a distance of 300 to 500 meters it causes numerous fractures with heavy destruction of the soft tissues at its exit. Striking from within a distance of 200 meters it produces a splintering injury. Because of ragged edges and rotating movements, splinter damage is more severe and extensive than that produced by bullets. Orbital injuries are rarely isolated and are usually a part of extensive damage to the face and skull. In 50 percent of the cases the paranasal sinuses were damaged, and in 24 percent the brain was involved. The appearance and size of the point of entry is not always indicative of the depth and extent of the damage. In 25 percent of the cases the fragments were found on the side opposite their entry, and in some cases the point of entry was at a distance from the orbit. There were cases in which the fragment entered through the lower lid of one eye, passed through the nose, and was arrested in the orbit of the opposite side. As a result, in the apparently severely damaged orbit the eyeball had symptoms of contusion, and in the good orbit the eyeball was perforated. Very frequently there is a disparity between the points of entry and the number of fragments shown by X ray, because the original fragment splinters on striking the bone and its fragments scatter in various directions. For this reason all orbital injuries

should be subjected to thorough clinical and roentgenologic study. The peculiarities of military injuries force the ophthalmologist to go beyond the orbital walls in order not to overlook injuries to the skull.

The clinical picture of these injuries varies greatly. The author proposes a classification based on the direction and extent of the wound and the relation of the foreign body to the orbit. The first division is into direct and indirect injuries. The direct are divided into diagonal, perpendicular, and contusion injuries. The diagonal and perpendicular are subdivided into those in which the bullet or fragment passes through the orbit, and those in which the destructive agent is arrested in the orbit. The clinical pictures for each of these types are described in detail.

The abundant blood supply of the face favors rapid healing of wounds, and accounts for the rarity of severe infections. Quite contrary to the rules for dealing with wounds in other parts of the body, all conjunctiva and lid tissue should be conserved, even if it appears hopelessly destroyed. One should leave in the wound all fragments of bone if they are attached to the soft tissue: osteomyelitis of the orbital bones in gunshot injuries is very rare, and fragments of bone serve to stimulate the reconstruction of fractured bones. The danger of gas infection on the face is negligible, and primary sutures should be introduced in order to prevent deformity of the lids, requiring subsequent plastic procedures. Particular attention should be paid to restoration of the conjunctival sac, because torn conjunctiva tends to adhere to bony fragments and to retract into the cicatrix. Wounds sutured even 8 to 12 days after the injury have healed well. Removal of accessible foreign

bodies should be attempted if they cause inflammatory phenomena, or, if they are located within the nasal sinuses. The military ophthalmologist should be conversant with injuries about the orbit and should know when to call in a surgeon or a neurosurgeon. Streptocide, a soluble sulfa drug, is used freely in the wounds. In exophthalmos due to retrobulbar hemorrhage it is well to suture the lids in order to safeguard the cornea. There is no indication for hasty enucleation of a destroyed eyeball. In cases in which a purulent discharge persists for a long time after enucleation one should suspect a fistula connecting the orbit with a nasal sinus which contains a foreign body. Roentgenographic investigation and elimination of the offending agent will usually be followed by cessation of the discharge. Ray K. Daily.

Liorber, G. C. **Retinal injuries.** *Viestnik Oft.*, 1943, v. 22, pt. 2, pp. 31-33.

A review of the literature on the etiology of retinal detachment, with special emphasis on macular holes, and including eight cases of holes in the macula reported in the Russian literature from 1910 to 1936. The author's own case was in a student, 14 years old, whose left eye was injured in an explosion of matches which he was grinding in a mortar. In addition to a contusion of the lids and a subconjunctival hemorrhage, he had a hole in the macula, which left him with a permanent central scotoma, and 0.2 visual acuity.

Ray K. Daily.

Lippincott, S. W., and Blum, H. F. **Neoplasms and other lesions of the eye induced by ultraviolet radiation in strain-A mice.** *Jour. Nat. Cancer Inst.*, 1943, v. 3, June, p. 545.

Neoplasms and other lesions of the

eye induced by ultraviolet radiation are described. Pathologic changes are superficial, being confined primarily to the cornea. There may be inflammatory changes, and the iris and lens may be involved secondarily. The tumors observed have been sarcomas and hemangioendotheliomas of the substantia propria. Changes in the epithelium of the cornea suggest that carcinomas may occur at times. The possible etiologic rôle of sunlight in producing lesions of the human eye is discussed. (6 illustrations.)

Gertrude S. Hausmann.

McLane, J. N. **Retinal hemorrhage in a case of rattlesnake bite.** Jour. Florida Med. Assoc., 1943, v. 30, July, p. 22.

A patient complained that, following the bite of a rattlesnake, the vision had been impaired in his eye. Examination of the fundus revealed a large round-shaped hemorrhage close to the macula area. Retinal hemorrhages are rarely recorded in patients bitten by poisonous snakes, chiefly because cases of very serious poisoning with involvement of the nerve center are seldom examined ophthalmoscopically before death.

Gertrude S. Hausmann.

McNabb, H. H. **The treatment of traumatic cataract.** Trans. Ophth. Soc. United Kingdom, 1942, v. 62, pp. 207-213.

The author advises expectant treatment of traumatic cataract. In adult patients with a hard nucleus the progress must be watched very carefully, as many individuals are sensitive to the action of their own lens protein, and iritis, cyclitis, or endophthalmitis may develop. Wounds associated with penetrating injuries by splinters of wood, forks, and the like almost invariably become septic, and for them the use of

the sulfa drugs locally has been of great help.

Beulah Cushman.

Mann, I., and Pullinger, B. D. **A study of mustard-gas lesions of the eyes of rabbits and men.** Amer. Jour. Ophth., 1943, v. 26, Dec., pp. 1253-1277. (25 illustrations, 2 tables.)

Markelova, Z. H. **Nonperforating wounds of the eyeball and lids.** Viestnik Oft., 1943, v. 22, pt. 1, p. 27.

Of the ocular military injuries, 58 percent were nonperforating. Accurate diagnosis and prompt treatment in the field hospital permitted 38 percent of these to return to service; 62 percent were sent to a base hospital. The lids and cornea were injured most frequently; rarely the sclera and conjunctiva. Most severe are the corneal injuries, which if not cared for properly are rapidly complicated by iritis and synechia, with visual impairment. Early atropinization of such cases is important. All corneal injuries should be hospitalized until complete recovery. Premature discharge has frequently led to an aggravation of the inflammatory process. The sharp injuries and blows as a rule injured the lids; blunt injuries affected the cornea. Foreign bodies embedded in the lids without causing inflammatory reactions were not removed. Of 57 lid injuries only 14 required repair with sutures. The right eye was injured in 52.5 percent of cases, the left in 42.5 percent, and both in 5 percent.

Ray K. Daily.

Martin, W. O. **Treatment and care of common eye injuries.** Jour. Med. Assoc. Georgia, 1943, v. 32, June, p. 189.

The author believes that every physician should be able to render first aid for the most common types of eye in-

jury. He reviews briefly the anatomy of the eyeball and the treatment of common corneal involvements, including burns. He condemns the promiscuous use of atropine.

T. M. Shapira.

Michaelson, I. C., and Kraus, J. **War injuries of the eye.** *Brit. Jour. Ophth.*, 1943, v. 27, Oct., pp. 449-461.

Seven cases of double injury to the walls of the eyeball by foreign bodies are described. In six cases in which the fundus could be observed ophthalmoscopically, a solid, raised white mass was seen projecting into the vitreous at the site of the exit wound. Two of the cases which were examined histologically showed proliferated choroid tissue projecting into the vitreous through a gap in the overlying retina. The plugging of the retinal gap by the choroid reaction would appear to be purposive in nature, because only two cases showed detachment of the retina, in spite of large retinal holes. (14 illustrations.)

Edna M. Reynolds.

Mitskevich, L. D. **Technique of suturing wounds of the lids.** *Viestnik Oft.*, 1943, v. 22, pt. 2, pp. 46-47.

The author describes a figure-eight suture for repair of through-and-through wounds of the lids. This suture, which brings together the cartilage and conjunctiva, makes for better coaptation of the wound edges, and prevents overriding of the cartilage segments. In first aid to lid injuries careful débridement with immediate suturing is important. For good healing it is important to have no tension on the sutures, and this the author accomplishes by means of canthotomy. (2 illustrations.)

Ray K. Daily.

Pfeiffer, R. L. **Traumatic enophthalmos.** *Arch. of Ophth.*, 1943, v. 30,

Dec., pp. 718-726; also *Trans. Amer. Ophth. Soc.*, 1943, v. 41.

Of 120 cases of fracture of the bones of the face in which the orbit was involved, enophthalmos was present in 53. Fracture of the orbit was observed in every case of traumatic enophthalmos during a period of ten years. All of the cases of traumatic enophthalmos uniformly showed roentgenographic evidence of a fracture of the floor of the orbit, with prolapse of orbital tissue into the maxillary sinus. In cases of severe enophthalmos the entire antrum was filled with orbital tissue.

The convex posterior portion of the floor of the orbit bulges upward back of the eyeball in a position to receive most of the force transmitted by a blow on the eye. As the floor is composed of very thin bone, it is easily ruptured, allowing orbital contents to herniate. Following such a displacement there is enophthalmos, often with disturbances in motility of the eye. Paresthesias of the face from fracture of the infraorbital canal and rupture of the infraorbital nerve are common.

Treatment may not be indicated unless the displacement is severe. Muscle operations have successfully overcome diplopia. The surgical correction of the enophthalmos is under study. Some attempt should be made to replace the inferior orbital wall and to prevent the herniation of orbital contents. The author suggests that patients exhibiting signs of recent contusion to the orbit be subjected to roentgenographic examination for possible internal fracture of the orbit. (2 photographs, 3 roentgenograms, 2 tables, bibliography.)

John C. Long.

Philps, A. S. **The extraction of magnetic foreign bodies from the vitreous chamber of the eye.** *Trans. Ophth. Soc.*

United Kingdom. 1942, v. 62, pp. 169-176.

The author describes the use of the magnet in removing foreign bodies from the vitreous through an opening made in the sclera.

The foreign body is localized with the use of the ophthalmoscope and X-ray, and if possible is drawn by a magnet into the area of the external rectus. The conjunctiva is opened and the external rectus muscle divided. A linear incision is made in the sclera after sutures have been placed, and the magnet is applied and the foreign body removed. The scleral suture is tied, the rectus muscle repaired, and the conjunctiva closed. Fifteen percent of the patients so treated showed vision of 6/12 or better; 11 percent, 6/18 to 6/60; 23 percent, finger counting and good perception; 50 percent, no light perception but the eye of normal size; 4 percent had shrunken eyes, and 42 percent of the eyes were lost. (4 illustrations.)

Beulah Cushman.

Pokrovsky, A. J. Characteristics of intraocular foreign bodies in military and civil injuries, and the technique of their removal. *Viestnik Oft.*, 1943, v. 22, pt. 1, p. 4.

This is a comparative study of 125 war injuries and 125 industrial injuries. The foreign bodies of war and industrial injuries differ in their magnetic properties. In industrial injuries 85 percent of the foreign bodies are magnetic. In war injuries 30 to 40 percent are nonmagnetic. An important characteristic of the foreign bodies in war injuries is their multiplicity and minute size. Not one of the industrial cases showed more than one foreign body; in the war injuries 15 percent of the eyes had several foreign bodies. In war injuries the foreign bodies penetrate

deeper into the posterior ocular segment, and may pass through the eyeball; double ocular perforations are therefore much more frequent in war injuries.

The operative data differed widely in the two types of injuries. In civil injuries, 70 to 75 percent of the foreign bodies were extracted within the first week after the injury. Because of the necessity of passing through several hospital stations the majority of war injuries were operated upon 20 to 70 days after injury. Of the industrial foreign bodies 82 percent were successfully removed with the electromagnet. Early in the war electromagnetic extractions were successful in 64 percent of war injuries. With accurate roentgenographic localization this percentage was increased to 72.

The author is an advocate of extraction through the sclera; he holds that extraction by this route is more often successful, and is followed by more rapid recovery and by less marked inflammatory reaction. The foreign body is less apt to be caught in the ciliary processes or iris, or to set up a cyclitis. The author uses prophylactic diathermy-coagulation of the sclera, which prevents retinal detachment and intraocular hemorrhage.

The delay in extraction of foreign bodies in war injuries adds to the difficulty of the procedure. After they become fixed in an exudate, they offer greater resistance to the electromagnet. To attract them with the greatest possible electromagnetic force they should be very precisely localized. This is possible only through close coöperation of ophthalmologist and roentgenologist.

Ray K. Daily.

Reese, A. B., and Khorazo, D. Endophthalmitis due to *B. subtilis* follow-

ing injury. *Amer. Jour. Ophth.*, 1943, v. 26, Dec., pp. 1251-1253. (References.)

Sudakevich, D. I. **Orbital prosthesis for the sequelae of war injuries.** *Viestnik Oft.*, 1943, v. 23, pt. 1, p. 25.

Protheses intended to replace losses of the facial tissues should be thin, small, and light, and should fit firmly to the face without interfering with movement of the facial muscles. This paper is an attempt to classify orbito-facial injuries for the purpose of determining the type of material suitable for a prosthesis. The author divides the injuries into orbital, orbitofrontal, orbitonasal, and orbitomalar. In orbital injuries the orbicularis oculi may be partially or totally destroyed. In partial destruction the muscle is contracted and will press on the edges of the prosthesis. In total destruction a soft prosthesis will have no support. Therefore prosthesis for orbital defects should be made of firm inelastic material. In orbitomalar injuries the prosthesis should be of soft pliable material, because cicatrices of the muscles of the face will tend to displace it forward and upward.

The orbitofrontal and orbitonasal injuries occupy an intermediate position between the orbital and orbitomalar. In orbitonasal injuries, contraction of the corrugator pulls the inner edge of the eyebrow down and in; the prosthesis should be firm, inelastic, and fastened to the bridge of the nose; and cases with destruction of the ala of the nose require elastic prosthesis.

Orbitofrontal injuries raise the eyebrows and upper lids, with frequent total destruction of the eyebrows. Destruction of the eyebrows and prominence of the upper margin of the orbit are indications for inelastic material to which can be fastened artificial eye-

brows. Extensive destruction of the forehead should be replaced by a pliable prosthesis.

Ray K. Daily.

Treatment of eyes injured by mustard gas. *Brit. Med. Jour.*, 1943, July 24, p. 111.

The clinical picture of the eye injured by mustard gas has three stages: first, stage of impregnation; second, acute stage; third, stage of recovery. The onset is without any symptoms and the gas becomes impregnated in the eye without any pain or discomfort. This lasts one to three hours. The acute stage begins suddenly with hypersecretion of the conjunctival and lacrimal glands. Edema of the eyelids closes the palpebral fissure. This lasts from two to five days. In recovery, the edema of the lids slightly subsides but the lacrimal secretion and the photophobia persist. This may last for weeks or months.

Bonnefon, in the First World War, irrigated the eyes with a warm hypertonic solution containing sodium sulphate. Even in cases of very intense palpebral edema this solution enters the fissure and osmotic drainage can occur. The osmotic treatment should be continued as long as there is any photophobia and lacrimation. Cocaine must never be used, as it will cause damage to the corneal epithelium. Liquid paraffin and oily drops must not be used so long as there is any possibility of dichlorethyl sulphide remaining in the conjunctival sac, because they are solvents of this substance and may cause further damage.

Gertrude S. Hausmann.

Turner, J. W. A. **Indirect injuries of the optic nerve.** *Brain*, 1943, v. 66, June, pp. 140-151. (See Section 11, Optic nerve and toxic amblyopias.)

17

SYSTEMIC DISEASES AND PARASITES

Allen, M., Flack, F., and Billings, M. L. **Three pedigrees of eye defects.** (Nystagmus and myopia.) *Jour. of Heredity*, 1942, v. 33, Dec., p. 453.

Two of the three short histories deal with hereditary nystagmus. The first includes case records of four school children.

The article "A familial study in myopia" discusses the presence and progress of shortsightedness in several families. Since all the patients included in the author's chart showed myopia before they were ten years old, he thinks it unlikely that use is a factor in the causation of this condition.

F. M. Crage.

Bellows, J., Cooper, J., and Bull, H. B. **Electrophoretic studies on serums of patients with ocular disturbances.** *Arch. of Ophth.*, 1943, v. 30, Nov., pp. 621-625.

The electrophoretic technique of Tiselius has been used by a number of workers to study the proteins in normal and pathologic human serums. In short, the components of a mixture of proteins are separated by their difference in mobility and the number and concentrations of the components determined.

Studies of serum proteins by earlier methods in cases of glaucoma failed to disclose abnormalities. In this paper the data obtained in electrophoretic analyses of the serums of 18 patients with various pathologic conditions are presented. The authors point out that for the most part the patients used in this study had other pathologic conditions associated with the ocular lesions.

The appearance of new protein fractions seemed to be a characteristic

observation in cases of chronic intraocular disease. This is thought to suggest that the pigment is the more important factor. Slight indications of the new fraction were found in the serum of patients with secondary glaucoma following extracapsular extraction and cortical cataract. (References, 1 table and 1 series of diagrams.)

R. W. Danielson.

García Miranda, Antonio. **Importance of the slitlamp in the study of starvation conditions.** *Arch. de la Soc. Oft. Hisp.-Amer.*, 1942, v. 1, July, pp. 108-113.

This is stated to be a preliminary communication. In the many cases of starvation or undernourishment following the Spanish civil war, the author noted a conjunctival injection which under high magnification was found to be arranged in two plexuses, one superficial and the other deep. This conjunctival injection is taken to be the first ocular manifestation of avitaminosis-A, perhaps present earlier than hemeralopia. When the process is further advanced, the injection is less noticeable, because the conjunctiva is thickened and the conjunctival vessels are obscured by conjunctival opacities. The Bitot spots appear still later. These early signs are seen more particularly in the conjunctival area corresponding to the palpebral fissure, and above all toward the caruncle and semilunar fold as well as in the region of the sclero-corneal limbus. Administration of riboflavin produced retrogression of the vascularity. The author suggests that the resemblance between the condition he describes and some forms of pannus or of keratitis from acne rosacea requires further investigation. (2 illustrations, references.) W. H. Crisp.

Green, Raymond. **The role of vitamins in ophthalmology.** Trans. Ophth. Soc. United Kingdom, 1942, v. 62, pp. 47-51.

From the general knowledge of vitamins and the author's own experience in polar expeditions he gives a table of the nature and source of the vitamins, the daily need, and signs of deficiency. He emphasizes that deficiency diseases seldom occur singly, and that deficiency may arise from deficient intake, deficient absorption, or increased needs of the body. A symptomless deficiency may carry on until some special condition arises, such as an injury or operation. Or the deficiency may be shown by undue susceptibility of the mucous membranes to infection. Fatigue is the symptom always found in frank deficiency. Beulah Cushman.

Harms, H. **Interrelationships between the condition of the nervous system and the eye.** Med. Klin., 1942, v. 38, Aug. 7, pp. 745-749.

This somewhat diffusely written article touches upon many points of relationship between the eye and the general nervous system, including scotoma scintillans, unilateral amblyopia, retrobulbar neuritis, cerebral concussion, disturbances of the fusion apparatus, hysterical blindness and ophthalmoplegias, and glaucoma.

W. H. Crisp.

Parry, T. G. W., and Laszlo, G. C. **Herpes zoster ophthalmicus—two rare manifestations.** Brit. Jour. Ophth., 1943, v. 27, Oct., pp. 465-467.

A case of acute retrobulbar neuritis and one of right abducens nerve paresis, both following herpes zoster ophthalmicus, are reported.

Edna M. Reynolds.

Pett, L. B. **Riboflavin and vitamin A in relation to "eyestrain."** Canadian Med. Assoc. Jour., 1943, v. 49, Oct., pp. 293-295. (See Section 3, Physiologic optics, refraction, and color vision.)

Scobee, R. G. **Ocular findings in feeble-minded male castrates.** Amer. Jour. Ophth., 1943, v. 26, Dec., pp. 1289-1298. (One table, references.)

Shapiro, A. L. **Blindness and multiple neuritis from vitamin-B deficiency.** Med. Bull. Veterans' Admin., 1943, v. 20, July, p. 106.

A case of multiple neuritis and blindness due to alcoholism is reported, and the relation of the disorder to vitamin-B deficiency is discussed. The patient was receiving a regular hospital diet, apparently adequate as to vitamin B, yet no improvement was obtained until large concentrated doses of thiamine were given, intramuscularly. Despite the long period of time which had elapsed before improvement was obtained, the author remarks that complete recovery proved possible once adequate therapy was instituted. Alcoholic addicts are especially susceptible to vitamin-B deficiency.

Gertrude S. Hausmann.

Williamson Noble, F. A. **The role of vitamins in ophthalmology.** Trans. Ophth. Soc. United Kingdom, 1942, v. 62, pp. 53-63.

A review of the literature is given. Vitamins in their crude form, such as vitamin A in cod-liver oil, are of more clinical value. Vitamins B and C are important in the metabolism of the cornea, the most important being riboflavin. Riboflavin cannot be synthesized by the cells of the body, and a continual supply from exogenous sources is re-

quired to make up what is lost in the urine and other excretions. Probably the metabolism of the avascular cornea is maintained by riboflavin. Corneal grafts are kept healthy by the cornea's own oxidative system independent of the blood supply. If this fails, the demand for hemoglobin results in corneal vascularization.

The lens seems dependent on the lactoflavin fraction of vitamin B. It does not, like the cornea, become vascularized if the enzymes are deficient, and it therefore degenerates. Vitamin C may provide the alternative means of respiration for the lens.

The deficiency of vitamins C, K, and P can be studied particularly well in the retina, as such deficiencies produce hemorrhages by various mechanisms. In vitamin-C deficiency, capillary hemorrhages are characteristic, arising from failure of the cement substance between the endothelial cells, and there is also a decrease in the coagulation time. Vitamin K, fat-soluble, is thought to combine with an unknown hepatic product to form prothrombin. Vitamin P probably has its action on the cell bodies of the capillaries, and increases their resistance to pressure. (Bibliography.)

Beulah Cushman.

18

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Andrade, Cesario de. **The Portuguese language in American congresses of ophthalmology.** *Arquivos Brasileiros de Oft.*, 1943, v. 6, June, pp. 98-100.

The author is pleased to record recognition of the Portuguese as well as the Spanish language as official during the Pan-American Congress of Ophthalmology in Cleveland, 1941. A "Brazil-United States Institute" has been

established at Rio de Janeiro. The author further mentions as significant of the general international movement the fact that a great many courses for the teaching of Portuguese have been organized in the United States.

W. H. Crisp.

Chance, Burton. **Emile Javal.** *Amer. Jour. Ophth.*, 1944, v. 27, Jan., pp. 45-48.

Chance, Burton. **Ophthalmology in Philadelphia in the early eighteen nineties.** *Trans. and Studies, Coll. Phys. of Philadelphia*, 1943, v. 11, June, pp. 77-81. (See *Amer. Jour. Ophth.*, 1943, v. 26, Nov., p. 1164.)

Elder, J. H. **Effectiveness of vitamin A in the treatment of defective color vision.** *Science*, 1943, v. 97, June 18, p. 561. (See Section 3, Physiologic optics, refraction, and color vision.)

Fox, S. A. **Optometry: a medical viewpoint.** *Dis. Eye, Ear, Nose, and Throat*, 1942, v. 2, Dec., p. 369.

The controversy between optometrists and ophthalmologists is discussed at length. Eventually optometry may "have to decide whether it is to be a skilled trade which purveys glasses or a profession devoted to eye treatment." One ophthalmologist feels that if optometry continues in its present course "the medical schools may find it necessary to absorb the teaching and control the practice of this profession." The increase in postgraduate medical study and consequent increase in eye physicians will force a decision. Closer relationship between the general practitioner and patient, which will cause the physician to refer the needy to the ophthalmologist, should help solve the problem of proper attention for eye troubles.

F. M. Crage.

Halliday, J. C. **The causes of blindness in children.** Med. Jour. Australia, 1943, v. 1, June 19, p. 556.

The cases admitted to the school for deaf and blind during the years 1911 to 1920 are tabulated. Optic atrophy, congenital cataract, and ophthalmia neonatorum seem to be the leading causes. Another summary several years later showed fewer cases of ophthalmia neonatorum. (2 tables.)

Gertrude S. Hausmann.

Harkness, G. F. **Industrial ophthalmology.** Industrial Med., 1943, v. 12, Oct., pp. 658-662.

The author, in surveying lightly the fields of industrial ophthalmology and otolaryngology, stresses the fact of governmental responsibility in the conservation of public health, and the consequent need for adequate unification of state laws regarding compensation and conservation of vision. It is important for the ophthalmologist, in turn, to have a proper basis for evaluating visual efficiency, and to be familiar with the specific needs of those industries with which he is connected. The surgeon is an important figure in the safety program of each industry. In this connection, the ophthalmologist should be familiar with proper lighting conditions. Any uncertainty regarding the compensability of an eye condition should be resolved in favor of the employee. The surgeon likewise has a responsibility to his employer, and must constantly be on the alert for malingerers.

In considering corneal foreign bodies and minor eye injuries, the author emphasizes the desirability of X-ray examination in every case at all suspicious. The technique for removal of foreign bodies is described; the author

feels that an eye patch is not indicated in every case, and that the guiding factor should be the subjective symptoms. Conservation of man-hours of work is a most important consideration.

(The paper contains also a number of observations on otolaryngological problems.) Benjamin Milder.

Judd, D. B. **Color-blindness and the detection of camouflage.** Science, 1943, v. 97, June 18, p. 544. (See Section 3, Physiologic optics, refraction, and color vision.)

Kravkov, C. V. **The significance of Newton's work in physiologic optics.** Viestnik Oft., 1943, v. 22, pt. 1, p. 3.

Kravkov credits Newton with being the founder of the physiology of color vision. In Newton's books on optics are found accurate descriptions of the refractive errors and of afterimages, and a correct conception of the crossing of the optic nerves at the chiasm. The relation of color perception to the physical properties of light was discovered first by Newton, who demonstrated that color differentiation was due to the varying refraction of the respective colored rays of light. On the principle of finding the center of gravity in mechanics, he designed a color circle with a method for determining the color resulting from various color mixtures.

Ray K. Daily.

Schurr, C. G. **Rehabilitation of the uniocular patient.** Brit. Jour. Ophth., 1943, v. 27, Oct., pp. 467-469.

The training program of the Royal Sussex County Hospital Rehabilitation Department for uniocular patients is outlined. The advantages of early training, beginning within a day or two after removal of the eye, are stressed.

Edna M. Reynolds.

Vishnevsky, H. A., and Flekkel, A. B. **A study on the recognition of colored signals by persons with defective color vision.** *Viestnik Oft.*, 1943, v. 23, pt. 1, p. 16. (See Section 3, Physiologic optics, refraction, and color vision.)

Wetzel, J. O. **Blindness in Michigan.** *Jour. Mich. State Med. Soc.*, 1943, v. 42, Jan., p. 39.

The author presents a survey with many statistical data. He also discusses blindness in the United States and Great Britain. His series includes over two thousand cases of adult blindness. In only 927 cases was the etiology undetermined or unspecified.

T. M. Shapira.

19

ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Clark, W. E. L. **The anatomy of cortical vision.** (Doyne Memorial Lecture.) *Trans. Ophth. Soc. United Kingdom*, 1942, v. 62, pp. 229-245.

As an anatomist the author is interested in the significance of the six-layer pattern of the lateral geniculate body. He obtained the brain of a monkey who had lost an eye in an accident some years before death. Later he was able to study the brain of a woman whose eye had been removed for glaucoma two years before death. In both instances the geniculate bodies showed exactly the same pattern of three layers receiving crossed fibers and the other three receiving uncrossed fibers. From these findings the writer became interested in following the projection of local retinal lesions on to corresponding local areas of cell atrophy in the nucleus, and he and his colleague Penman were able to determine the pattern of localization in the geniculate

body with great accuracy and to show that it represented point-to-point projection.

Transneuronal degeneration, which could be detected in the geniculate body one week after section of the optic nerve, might be indicative of an extreme specificity of function of the cells of the nucleus, and suggested to the author that the cells might depend entirely for continued activity on the reception of impulses from the retina, and that there were no other sources of afferent stimuli which maintained their vitality.

It was found that the optic nerves ended in the geniculate body in specialized ring formations, "terminal buttons." Degenerative reactions were demonstrable seven days after section, and direct proof was obtained that crossed fibers end entirely in laminae 1, 4, and 6, and uncrossed fibers entirely in laminae 2, 3, and 5. Each optic-nerve fiber ended in its appropriate lamina by dividing into 5 or 6 terminal branches, and each of these branches established connection with only one cell. It was also found that if the visual cortex of a monkey was completely destroyed all the nerve cells of the corresponding geniculate body appeared to undergo complete atrophy.

The three laminae for each eye also called for explanation, the lamination of the lateral geniculate bodies appearing abruptly during the sixth fetal month. One optic nerve of a monkey was sectioned. After time for degeneration of the optic fibers, sections of the optic tract showed no evidence of laminar arrangement, and it was only within the geniculate body that the retinal fibers sorted themselves out to reach their appropriate laminae. The author noted at this time that the smallest retinal lesion produced recog-

nizable changes affecting portions of all three of the corresponding cell laminae. He came to the conclusion that the conducting unit from the retina to the lateral geniculate body was a three-fiber unit. This supports the idea that the laminar pattern of the geniculate body may be related to trichromatic color vision. By means of the geniculate body, crossed and uncrossed retinal impulses are supposed to be brought into intimate relation with each other immediately on their

arrival at the cortex, thus providing for fusion of impressions necessary in stereoscopic vision.

Finally the author concludes that the geniculate body is a simple relay mechanism through which retinal impulses are immediately projected on to the visual cortex, and that there is no possibility that these impulses can be distorted and modified by other unrelated types of nervous impulse influencing the cells of the nucleus. (4 illustrations, references.) Beulah Cushman.

NEWS ITEMS

Edited by DR. DONALD J. LYLE
904 Carew Tower, Cincinnati 2

News items should reach the editor by the twelfth of the month

DEATHS

Dr. Athens V. Lodge, Brewster, Massachusetts, died November 18, 1943, aged 71 years.

Dr. Thomas O. Brown, Osage, Kansas, died November 12, 1943, aged 74 years.

Dr. H. Harms, Newton, Kansas, died November 25, 1943, aged 84 years.

Dr. Adolph F. Hofkin, Philadelphia, Pennsylvania, died December 12, 1943, aged 68 years.

Dr. Harry, W. Houf, Sr., Minturn, Colorado, died December 3, 1943, aged 68 years.

Dr. Edward A. Kennedy, Pittsfield, Massachusetts, died December 14, 1943, aged 63 years.

Dr. Alfred L. Marks, Spokane, Washington, died in December, 1943, aged 63 years.

Dr. Charles E. Padelford, Holley, New York, died December 6, 1943, aged 74 years.

Dr. James A. Bach, Milwaukee, Wisconsin, died November 29, 1943, aged 83 years.

Dr. Roger Biswell, Baker, Oregon, died November 12, 1943, aged 62 years.

Dr. Arthur E. Gadbois, Norfolk, Nebraska, died November 19, 1943, aged 68 years.

Dr. Carlton D. Morris, Pontiac, Michigan, died November 28, 1943, aged 73 years.

Dr. Louis S. Smith, Brooklyn, New York, died October 23, 1943, aged 47 years.

Dr. Charles H. May, New York, New York, died December 7, 1943, aged 82 years.

Dr. Raymond D. Sleight, Battle Creek, Michigan, died December 7, 1943, aged 68 years.

Dr. Edmond E. Blaauw, Buffalo, New York, died December 4, 1943, aged 76 years.

Dr. Charles H. Brobst, Peoria, Illinois, died November 25, 1943, aged 77 years.

Dr. Henry W. Champlin, Towanda, Pennsylvania, died December 8, 1943, aged 86 years.

Dr. Sanford Robinson Gifford, Chicago, Illinois, died February 25, 1944, aged 52 years.

Dr. A. Vogt, Zurich, Switzerland, died December 10, 1943, "after a severe disease."

MISCELLANEOUS

The Department of Ophthalmology of the George Washington University School of Medicine will give its seventh annual postgraduate course in ocular surgery, pathology, and orthoptics, April 24 to 29, 1944, inclusive. This is a practical course, limited to 30 registrants. Surgery will be performed by the registrants on animal eyes. Ocular pathology will be illustrated with slides and by the use of the microscope. Orthoptic training will be taught

with cases and demonstrations. The fee is \$150.00. Further details will be furnished by the secretary, Miss Louisa Wells, 927 Seventeenth Street, N.W., Washington, D.C.

The Department of Otolaryngology of the University of Illinois College of Medicine announces its spring refresher course, to be held at the College in Chicago, March 20th to 25th, inclusive. The course is intended primarily for specialists who, under existing conditions, are able to devote only a brief period to postgraduate review study. The fee is \$50.00. Registration will be limited. In requesting application, state school and year of graduation; and give details concerning specialty training and experience. Address: Department of Otolaryngology, University of Illinois College of Medicine, 1853 West Polk Street, Chicago, Illinois.

One of our advertisers, the National Electric Instrument Company, was the recipient in November, 1943, of a star for its Army and Navy "E" award. National received its Army and Navy "E" award in February, 1943.

A gift of \$10,000 was given to the Department of Ophthalmology of the Medical School of the University of Kansas by Dr. Edward J. Curran of Kansas City, professor and head of the department of ophthalmology, to provide the necessary equipment and assistance for research in the department.

SOCIETIES

The third regular meeting of the Ophthalmological Society, European Theater of Operations, was held on November 13, 1943, in the sumptuous new Officers Club Auditorium at the Headquarters of the 8th Air Force. There was an attendance of nearly 100, including many flight surgeons and guests from Allied Services.

The group was welcomed by Brig. Gen. Malcom C. Grow (MC), Surgeon, U.S.A. Air Forces in this theater, and host Brig. Gen. Paul R. Hawley (MC), Chief Surgeon, E.T.O., spoke briefly, commending the ophthalmic medical officers for being the first and most active group in this theater in organizing their specialty, and in publishing a journal. Four excellent moving pictures of ocular surgery were shown. Dr. S. A. Leader, one of Britain's leading authorities in the manifold application of new plastics in the field of medicine, gave a most instructive talk on this sub-

ject. In ophthalmology plastics are already invaluable in the production of prostheses and contact lenses, and will play an increasing role in the protection of the globe in severe burns, and in the construction of large prosthetic appliances for deformities of the face. Plastics can meet any requirement in consistency, color, form and radio-opacity, and can be made self-sterilizing. The morning program closed with an interesting discussion on "Macular degeneration of unknown origin" by Squadron Leader J. Doggart, R.A.F., and a consideration of "Ophthalmic surgery in the field" by Brigadier Sir Stewart Duke-Elder, Chief Ophthalmic Consultant, R.A.M.C. Sir Stewart described the problems, experiences, and lessons encountered by ophthalmic medical officers with British Forces in Africa and the Middle East. He emphasized that a man without needed glasses is as much a casualty as a wounded soldier. This problem would be more serious for the British than the Americans, because the former have used lower visual standards in their combat forces. He warned against too hasty and too numerous enucleations, and advised that every man with an open wound of the globe be regarded as a litter patient. He did not feel that an implant after enucleation was worth the trouble. Asked for a practical test for night vision to rule out malingering, he recommended ordering the soldier to cross, in the dark, a latrine trench across which there was a single plank. If he fell in, the night blindness was considered genuine.

After lunch, and a photograph of the group had been taken, Air Commodore P. C. Livingston, Chief Ophthalmologist for the R.A.F., gave an excellent talk on "Scotopics." Commodore Livingston has for many years been a leader in research on night vision and its application to night flying. The factors involved are many, but the careful screening of night fliers, by such as his hexagon test, and their training in how to see best in the dark, and among searchlights, has proved its value manyfold.

Both the R.A.F. and the U.S.A.F. had exhibits of their ocular equipment for testing, and for use by fliers. Several patients from Moorfields Eye Hospital, London, were demonstrated. The last paper was entitled "Influence on ocular function of oral use of sulfa drugs," read by Major N. S. Rubin (MC), 8th Air Force, who with Capt. Carlisle E. McKee was host and had arranged the meeting.

At a short business meeting Commodore Livingston was elected the fourth Honorary Member of the Society, the others being Brigadier Sir Stewart Duke-Elder, Lt. Commander Edwin Dunphy (U.S.N.), and Sir Ian Fraser.

At the meeting of the Colorado Ophthalmological Society on January 15, 1944, a symposium on contusions to the eye was presented. The following papers were given: "The bony orbit," by Dr. W. T. Brinton; "Conjunctiva and surrounding tissues," by Dr. Samuel Goldhammer; "Anterior segment of the eye," by Dr. Leo Davis; and "Posterior segment of the eye," by Dr. Edna Reynolds.

The eightieth annual meeting of the American Ophthalmological Society will be held at The Homestead, Hot Springs, Virginia, on May 29, 30, 31, 1944.

The members are requested to send to the chairman of the program committee, Dr. Walter I. Lillie, as soon as possible, the titles and brief abstracts of such papers as they desire to present at the meeting before April 15th, to be incorporated in the call for the meeting to be sent out about May 1st.

At a recent meeting of the Indianapolis Ophthalmological Society, Dr. Paul G. Moore, assistant clinical professor of ophthalmology at Western Reserve University School of Medicine, spoke on "The end results following intraocular foreign bodies."

The Los Angeles Society of Ophthalmology and Otolaryngology appointed the following officers for 1944: president, Dr. M. E. Trainor; vice-president, Dr. Kenneth Brandenburg; secretary-treasurer, Dr. Orrie E. Ghrist; and committeewoman, Dr. Etta C. Jeancon.

PERSONALS

Among the members of the Philadelphia County Medical Society who were given testimonial certificates for having been in practice 50 years or more was Dr. Burton Chance, Sr.

Dr. William E. Bruner, professor emeritus of ophthalmology, Western Reserve University School of Medicine, Cleveland, celebrated his fiftieth year in the practice of medicine at a dinner on January 4th. He was presented with a silver tray engraved with the names of his guests, his associates at the eye clinic of the old Lakeside Hospital.

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